

2023-1603, 2023-1604

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**United States Court of Appeals  
for the Federal Circuit**

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SAGE PRODUCTS, LLC,

*Appellant,*

— v. —

BECTON, DICKINSON AND COMPANY,

*Appellee.*

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*On Appeal from the United States Patent and Trademark Office, Patent  
Trial and Appeal Board in Nos. IPR2021-01201 and IPR2021-01202*

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**NON-CONFIDENTIAL OPENING BRIEF FOR  
APPELLANT SAGE PRODUCTS, LLC**

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AUGUST 22, 2023

## **REPRESENTATIVE PATENT CLAIMS AT ISSUE**

Claim 1 of US Patent No. 10,398,642 Patent (“642 Patent”) recites:

1. A sterilized chlorhexidine product for topical disinfection, said sterilized chlorhexidine product comprising:

a sterilized chlorhexidine gluconate composition;

an applicator for facilitating application of the sterilized chlorhexidine composition; and

a receptacle containing the sterilized chlorhexidine gluconate composition to provide the sterilized chlorhexidine gluconate composition to impregnate the applicator when the receptacle is compromised;

wherein the sterilized chlorhexidine gluconate composition comprises chlorhexidine gluconate and alcohol.

Claim 7 of the 642 patent recites:

7. The sterilized chlorhexidine product of claim 1, wherein the sterilized chlorhexidine gluconate composition further comprises one or more additives selected from the group consisting of a sterilized surfactant, a sterilized pH adjuster, a sterilized odorant, a sterilized colorant, a sterilized stabilizer, a sterilized skin protectant, a sterilized preservative, or combinations thereof.

Claim 20 of the 642 patent recites:

20. The method of claim 12, wherein said sterilized chlorhexidine article has a sterility assurance level of from  $10^{-3}$  to  $10^{-9}$ .

Appx228.

**UNITED STATES COURT OF APPEALS  
FOR THE FEDERAL CIRCUIT**

**CERTIFICATE OF INTEREST**

**Case Number** 2023-1603

**Short Case Caption** Sage Products, LLC v. Becton, Dickinson and Company

**Filing Party/Entity** Sage Products, LLC

**Instructions:**

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2. Please enter only one item per box; attach additional pages as needed, and check the box to indicate such pages are attached.
3. In answering Sections 2 and 3, be specific as to which represented entities the answers apply; lack of specificity may result in non-compliance.
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Date: 03/31/2023

Signature: /s/ Sandra A. Frantzen

Name: Sandra A. Frantzen

## FORM 9. Certificate of Interest

Form 9 (p. 2)  
March 2023

<b>1. Represented Entities.</b> Fed. Cir. R. 47.4(a)(1).	<b>2. Real Party in Interest.</b> Fed. Cir. R. 47.4(a)(2).	<b>3. Parent Corporations and Stockholders.</b> Fed. Cir. R. 47.4(a)(3).
Provide the full names of all entities represented by undersigned counsel in this case.	Provide the full names of all real parties in interest for the entities. Do not list the real parties if they are the same as the entities.  <input type="checkbox"/> None/Not Applicable	Provide the full names of all parent corporations for the entities and all publicly held companies that own 10% or more stock in the entities.  <input type="checkbox"/> None/Not Applicable
Sage Products, LLC	Stryker Corporation	Stryker Corporation

☐ Additional pages attached

FORM 9. Certificate of Interest

Form 9 (p. 3)  
March 2023

**4. Legal Representatives.** List all law firms, partners, and associates that (a) appeared for the entities in the originating court or agency or (b) are expected to appear in this court for the entities. Do not include those who have already entered an appearance in this court. Fed. Cir. R. 47.4(a)(4).

☒ None/Not Applicable ☐ Additional pages attached


**5. Related Cases.** Other than the originating case(s) for this case, are there related or prior cases that meet the criteria under Fed. Cir. R. 47.5(a)?

☒ Yes (file separate notice; see below) ☐ No ☐ N/A (amicus/movant)

If yes, concurrently file a separate Notice of Related Case Information that complies with Fed. Cir. R. 47.5(b). **Please do not duplicate information.** This separate Notice must only be filed with the first Certificate of Interest or, subsequently, if information changes during the pendency of the appeal. Fed. Cir. R. 47.5(b).

**6. Organizational Victims and Bankruptcy Cases.** Provide any information required under Fed. R. App. P. 26.1(b) (organizational victims in criminal cases) and 26.1(c) (bankruptcy case debtors and trustees). Fed. Cir. R. 47.4(a)(6).

☒ None/Not Applicable ☐ Additional pages attached


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**CONFIDENTIAL ADDENDUM MATERIAL OMITTED**

There are no redactions in the body of the brief. Language on pages of the appended Final Written Decisions in IPR2021-01201 (Appx83-84) and IPR2021-01202 (Appx187-189) that relate to information that Appellee identified as confidential was redacted in the public versions of those decisions pursuant to the Protective Order in those matters. The language “Confidential: Board and Parties Only” on the covers was also redacted in the public versions (Appx1, Appx104).

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**TABLE OF ABBREVIATIONS**

<b>Abbreviation</b>	<b>Description</b>
642 Patent	U.S. Patent No. 10,398,642 (Appx208-228)
067 Patent	U.S. Patent No. 10,688,067 (Appx229-249)
BD	Petitioner and Appellee, Becton Dickinson and Company, including predecessors such as CareFusion
CHG	Chlorhexidine gluconate
Colorant Claims	Claims 7, 8, 17, and 18 of the 642 and 067 Patents
Dabbah	Dr. Roger Dabbah, BD's expert
Degala	U.S. Patent App. Pub. No. 2015/0190535 (Appx1568-1580)
Decisions	The Board's Final Written Decisions issued in IPR2021-01201 (Appx1-103) and IPR2021-01202 (Appx104-207)
PAR	"Public Assessment Report" (Appx1520-1543)
POSA	Person of ordinary skill in the art
Rutala	Dr. William Rutala, Sage's expert
Sage	Patent Owner and Appellant, Sage Products LLC, a subsidiary of Stryker Corporation
SAL	Sterility assurance level
SAL Claims	Claims 10 and 20 of the 642 Patent and Claims 10 and 19 of the 067 Patent
SOC	Statement of The Case (in this brief)
UK	United Kingdom

## **STATEMENT OF RELATED CASES**

There have been no other appeals from the present consolidated actions in this or any other appellate court. This Court’s decision in the pending appeals may affect the district court litigation in *Sage Products, LLC v. Becton, Dickinson and Co.*, No. 2:20-8000-KM-JBC (D.N.J.), which has been administratively stayed.

## **JURISDICTIONAL STATEMENT**

On January 9, 2023, the Patent Trial and Appeal Board (“Board”) issued Final Written Decisions (“Decisions”) determining that Claims 1-3, 5-8, 10-18 and 20 of the 642 Patent and Claims 1-3, 5-8, and 10-19 of the 067 Patent were unpatentable. The Board had jurisdiction pursuant to 35 U.S.C. §314. Appellant Sage Products (“Sage”) timely appealed on March 7, 2023. This Court has jurisdiction pursuant to 28 U.S.C. §1295(a)(4)(A) and 35 U.S.C. §141(c).

## **INTRODUCTION**

For years, healthcare workers mistakenly believed that topical antiseptics such as chlorhexidine were inherently “sterile” and were plagued with outbreaks and deaths from antiseptics contaminated with pathogens. By 2012, FDA held hearings to address whether antiseptics should be *sterilized* (e.g., subjected to suitable sterilization processing), issuing guidance to address manufacturer mislabeling of

antiseptics as “sterile” when they were not sterilized—including Becton Dickinson’s (BD’s) mislabeled US ChloroPrep product.<sup>1</sup>

The industry resisted sterilization requirements because sterilizing antiseptics involved major “technical challenges” and was “impossible” and “impractical.” Creating sterilized chlorhexidine products containing sterilized chlorhexidine gluconate (“CHG”) was particularly challenging, and sterilization efforts in the mid-2010s were inconsistent and marked by failures due to the instability of the molecule.

The patents-in-suit, filed in 2015, were the first to describe sterilized chlorhexidine products/articles that could contain, deliver, and apply sterilized CHG compositions. Unlike the prior art, the products/articles were reliably and consistently sterilized, could include sterilized colorants, and had a sterility assurance level (“SAL”) from about  $10^{-3}$  to  $10^{-9}$ .

The Board nevertheless found that a 2010 UK “Public Assessment Report” (“PAR”) for ChloroPrep that used the word “sterile” (like the incorrectly-labelled US ChloroPrep products), but did not mention sterilized chlorhexidine products, articles, compositions, or colorants (or any SAL), rendered the claims unpatentable.

The Board’s Decisions are filled with legal error and unsupported by the record. The Board repeatedly exceeded its authority by manufacturing grounds of anticipation and obviousness never presented by BD in its Petition, inventing new

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<sup>1</sup> “BD” includes Becton Dickinson and predecessors (including CareFusion).



“knowledge” in the art, new unpatentability theories, and new art combinations. But the Board “does not ‘enjoy[] a license to depart from the petition and institute a *different* [IPR] of [its] own design.’” *SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1356 (2018) (emphasis original).<sup>2</sup>

In Ground I, the Board found anticipation by PAR based on grounds never presented in the Petition and that went far beyond PAR’s four corners. After concluding that a POSA must know **UK** regulatory standards for ChloroPrep, the Board relied on “British Standards” for sterilization to import non-existent “sterilization” disclosure into PAR. The imported standards, which were not mentioned in PAR, applied to “medical devices” (not “medicinal products” like ChloroPrep). The Board also inappropriately relied on ***other prior art*** as well as ***confidential*** information about BD’s UK ChloroPrep ***product*** and ***secret manufacturing process***—not presented in BD’s Petition—to further supplement PAR’s disclosure. And, when this other information still did not suffice, the Board filled in the remaining gaps by finding entire elements disclosed ***based on newly-contrived “knowledge in the art.”*** The Board also created new theories about why “sterilized colorants” and specific SALs (dependent claims) were inherently

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<sup>2</sup> Unless noted, all emphases herein are added. Citations and quotations are generally omitted.

disclosed—though PAR mentioned neither. PAR did not disclose the claimed inventions, let alone enable them.

In Ground II, though BD alleged obviousness over “*PAR alone*,” the Board again exceeded its authority, inventing its own obviousness grounds and determining that the claims were obvious in view of PAR and *other references* such as Chiang, Scholz, and Degala despite *none of them being referenced in the Petition* for that ground. The Board’s newly-conceived grounds were flawed, as even the new combinations failed to teach numerous limitations.

In Ground III, the Board once again side-stepped BD’s *petitioned* obviousness theory based on PAR and Degala, again relying on newly-contrived “knowledge in the art” to fill in missing limitations and inventing new “motivations” for doing so without considering whether success was likely. Degala did not cure PAR’s failure to teach a sterilized chlorhexidine *product or article*, let alone one with the claimed SAL, nor did it teach a validated CHG sterilization.

The Board’s Decisions should be reversed.

### STATEMENT OF ISSUES

1. Whether the Board exceeded its authority in finding unpatentability based on grounds and arguments never raised in the Petition.

2. Whether the Board erred in finding unpatentability based on a level of skill in the art that required knowledge of UK regulatory requirements, but no knowledge of challenges in sterilizing chlorhexidine antiseptics.

3. Whether the Board erred in finding anticipation and obviousness in view of PAR where elements were not disclosed or enabled, and the Board relied on materials outside PAR including “regulatory standards,” other art, and *confidential* information about BD’s ChloroPrep *product*.

4. Whether the Board erred in finding anticipation and obviousness when elements were not disclosed, but the Board relied on general “knowledge” (rather than evidence or prior art) to supply missing claim limitations.

5. Whether the Board’s findings of anticipation and obviousness were supported by substantial evidence.

## STATEMENT OF THE CASE

### I. BACKGROUND OF THE INVENTION

Healthcare-associated infections have been a significant problem, resulting in deaths and excess healthcare costs. Appx3444-3445;<sup>3</sup> Appx3034. Patients are at heightened risk of infection during surgeries where pathogens can be introduced inadvertently. To minimize infection, healthcare providers use topical antiseptics

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<sup>3</sup> Given the overlap, Sage cites materials from lead appeal No. 2023-1603 unless a relevant distinction exists.

near the surgical area. Appx215(1:19-31). As explained in a seminal paper authored by Sage’s expert, Dr. William Rutala, commonly-used antiseptics include alcohol, chlorhexidine, and iodine. Appx3034-3041; Appx3445.

Chlorhexidine, and its salt chlorhexidine gluconate (CHG), has been particularly effective due to its potency, persistent activity, and low toxicity. Appx3445-3446. The parties both sell preoperative antiseptic products containing CHG. Sage sells cloth wipes. Appx2167-2168. BD sells versions of a product called “ChloraPrep” that includes an applicator and an ampoule containing CHG. Appx2170-2173; Appx3075-3079.

#### **A. Challenges With Sterilization Of Chlorhexidine Antiseptics**

For years, healthcare workers mistakenly believed antiseptics were inherently sterile. Appx3446; Appx3011. A 2012 FDA article reported on this misconception, explaining “it was assumed that antiseptic drug products were free of microbial contamination because of their pharmacologic activity.” Appx3042.

But, in the 2000s, contaminated antiseptics caused numerous outbreaks and deaths, challenging the assumption of inherent “sterility.” Appx3446-3447; Appx3016-3017; Appx3035-3037; Appx3043-3044, Appx3057-3061; Appx3574-3575. The FDA article, citing Dr. Rutala’s paper, “raised concerns” because “antiseptic products may become contaminated....” Appx3043-3045. By the early 2010s, the problem became acute with several serious incidents. Appx3447-3448;

Appx3007; Appx3354-3357. In 2012, FDA announced hearings to determine “how to address microbial contamination,” noting sterilization of antiseptics was not required. Appx3001-3003.

During the FDA hearings, industry stakeholders resisted sterilization requirements, describing *challenges in creating sterilized antiseptics*. Appx3004-3033; Appx3042-3045; Appx3575-3581. One 2013 article (Pyrek) reported how industry representatives “emphasized the challenges these processes entailed and the *difficulties of achieving sterility*.” Appx3027. Commentators described how “sterilization...is *impossible* or impractical,” “problematic,” “terminal sterilization is *difficult or impossible* to achieve,” and “*technical challenges exist* relative to...sterilization.” Appx3013, Appx3026-3028. CHG was known to be particularly challenging because of its unstable chemistry and potential to degrade. Appx3013, Appx3027-3029; Appx221-223(17:14-33,14:42-45); Appx4452-4454; Appx4427-4430; Appx3447-3451, Appx3547-3552. Concerns were raised about whether sterilization “might adversely affect the purity and quality.” Appx3044. Indeed, PTAB held in another matter (at BD’s urging) that “[CHG] is a relatively unstable compound that degrades with just the application of heat.” Appx4452.

BD documented the difficulties reported at the 2012 hearings, but never mentioned any solutions. Appx4314-4323; Appx3576-3577.

## B. BD's Unsterilized ChloroPrep Products That Were Mislabeled "Sterile"

In 2013, again citing Dr. Rutala, FDA issued guidance, advising manufacturers to “revise the product labels for topical antiseptics to indicate whether the drug is manufactured as a sterile or nonsterile product” due to the confusion over sterility. Appx3046-3049. Specifically, antiseptics had been mislabeled “sterile” though products were not fully sterilized (e.g., subjected to sterilization processing). Appx3452.

It is *undisputed* that the ChloroPrep manufacturer (then CareFusion) misused the term “sterile” on its label—the product did *not* contain a sterilized antiseptic composition. Appx3452-3456; Appx3050-3051; Appx3075-3079 (FDA website referencing ChloroPrep labels); Appx3105, Appx3113, Appx3122, Appx3129, Appx3136 (ChloroPrep labels); Appx5362.



In **2015** (the time of the invention), CareFusion reported changing its ChloroPrep labels to indicate its product was *actually* “nonsterile” and issued a paper (the “FAQ”) explaining that its CHG solution was “not sterile” despite its prior packaging. Appx3050-3051. The FAQ explained that “contents have not been sterilized individually...[and] the solution inside of the applicators is *not treated with a separate sterilization process* and, therefore is ***not sterile***.” *Id.*; Appx3495-3496, Appx3054-3055. Despite BD’s assertions that sterilized CHG products were available, its 2015 FAQ reported the opposite: “[c]urrently, sterile [CHG]-based products are *not available* because an efficient method does not exist to sterilize....” Appx3050.

### **C. Prior Art Descriptions Of Sterilized Chlorhexidine Products**

The industry began work on solutions to the “impossible” and “difficult” problem of sterilizing chlorhexidine products. Appx3456-3458. However, prior to the patents-at-issue, none solved the problem of providing a *sterilized* chlorhexidine *product or article* that was configured to contain, deliver, and apply a *sterilized CHG composition*, much less do so reliably and consistently (via a validated procedure). Appx3456-3469, Appx3538. BD identified no prior art describing ***any*** sterilized chlorhexidine *products/articles*—much less ones containing *reliably* sterilized CHG *compositions*—the combination that the prosecution confirmed was novel over the prior art. *Id.*; Appx1143; Appx1279. Indeed, the field remained nascent for years

with many trying—and failing—to solve the problem. Appx3469(¶104), Appx3535-3537(¶¶310-14), Appx3549-3550(¶353), Appx3571(¶412), Appx3583(¶447).

**Scholz**, published in 2006, reflected the misconception that sterilization was unnecessary because antiseptics “demonstrate a broad spectrum of antimicrobial activity and thus are generally *not terminally sterilized*....” Appx1600(¶178). While Scholz stated compositions “*may* be sterilized by a variety of industry standard techniques,” Scholz described no methods for doing so. *Id.*; Appx3459-3460, Appx3497-3498, Appx3507-3508, Appx3548-3549. Instead, Scholz mentioned adding “preservatives in the formulation to prevent growth of...organisms” and theorized that “[i]t *may* be preferred to sterilize the compositions in their final packaged form using electron beam. It may also be *possible* to sterilize the sample by gamma radiation or heat.” Appx1600(¶178).

**PAR**, purportedly published in 2010 in the UK, used the word “sterile” to describe the ChloroPrep product (just like the 2013 ChloroPrep labels that used the word “sterile” on unsterilized US ChloroPrep products). Appx1520-1543. But the 2010 PAR never described that *any* product/article *or* component had been subjected to sterilization processing. Appx3460-3462, Appx3494-3499.

BD’s Petition argued that **Margoosian**, published in October 2014 (Appx1621), “describes ‘a process for...sterilizing a chlorhexidine-based antiseptic formulation....’” Appx6030. Yet, it was *undisputed* that Margoosian did not teach a



POSA how to *actually* sterilize CHG. Appx4421-4437; Appx4438-4441; Appx3462-3464, Appx3448-3451, Appx3571, Appx3577-3582. Indeed, BD successfully convinced a *different* Board that “using temperature and time conditions for sterilization as set out in Margoosian *does not produce sterile products.*” *Ex parte Degala*, Appeal 2020-000893, 2021 WL 165153, at \*7-8 (P.T.A.B. Jan. 4, 2021) (Appx4442-4454). There, BD repeatedly (and successfully) represented that:

- “*regardless of the assertions made in Margoosian regarding its alleged sterility, the solutions therein that contain...[CHG]...are **not** sterile....*”
- “the [Margoosian] sterilization process...is *not capable of adequately sterilizing* such solutions”
- Margoosian does not “provide any reasonable expectation that such a [sterile] solution could be successfully obtained”
- “it is commonly understood in the chemical arts that different classes of chemicals....can drastically alter a composition’s properties, [a POSA] would not expect a method of sterilizing the liquids in [other art] to still work as intended once additional components are added, including [CHG].”

Appx4426-4430 (bold emphasis original); Appx4438-4441 (testing showing Margoosian was “not sterile”). The other Board ultimately found that “[CHG] is a relatively unstable compound that degrades with...heat and there was no expectation

that other sterilization methods would be successful.” *Degala*, 2021 WL 165153, \*6.

*Chiang*, published in December 2014, explained “[o]ne of the challenges associated with...antiseptic compositions is the need to sterilize the exterior of the applicator while *minimizing potential byproducts* that may be produced when the composition is exposed to sterilization compounds...” Appx3330(¶9). That is because “sterilants...may react with the active antimicrobial agent..., altering the potency or producing potentially toxic compounds.” *Id.* Chiang reported that ChloroPrep avoided “this problem” because “the sealed glass ampule protects the CHG composition during the sterilization process...[that] could otherwise compromise the efficacy,” thus suggesting one should avoid CHG sterilization. *Id.*(¶10.) Problems nevertheless arose from attempts to “minimize” sterilants impact on CHG. *Id.*(¶12.); Appx3449-3450, Appx3464-3466, Appx3496-3497.

*Degala*, published in July 2015, further established the uncertainty at the time of the invention. Degala criticized prior CHG sterilization methodologies based on “the industry belief that high temperature sterilization is not suitable due to the expected degradation.” Appx1570(¶4). While Degala (like Margoosian) purported to describe CHG sterilization at various times and temperatures, Degala’s method did not result in consistently and reliably sterile CHG compositions. Appx3466-3468, Appx3556-3559. Compositions were often *not* sterile and contained impurities. Appx1576(Tables 10&11). Moreover, Degala did not describe any

*product/article* containing the CHG was *itself* sterilized. Appx3469, Appx3553-3555.

*No reference* disclosed a “sterilized colorant”—much less how to sterilize one in a CHG composition. Appx3523-3525(¶¶269-276). Chiang explained “[o]ne of the challenges...is that the CHG...compositions are often ***not stable*** with dye components.” Appx3330(¶13). Nor did any reference describe a sterilized chlorhexidine *product/article*, much less one with an SAL from  $10^{-3}$  to  $10^{-9}$ . Appx3527-3528, Appx3560-3562.

## II. SAGE’S INVENTIONS

The patents-at-issue, based on a provisional filed in November 2015, were the first to solve the problem of providing ***sterilized chlorhexidine products and articles*** that could contain, apply, and deliver ***sterilized CHG compositions*** with consistent and reliable results. Appx3469-3470(¶¶105-108). Appx208; Appx229.<sup>4</sup>

Independent **Claims 1 and 12** of both patents do *not* recite methods of sterilizing CHG solutions; rather, they recite ***sterilized chlorhexidine products or articles*** that allow for containment, application, and delivery of a ***sterilized*** CHG composition using an applicator impregnated with the sterilized composition.

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<sup>4</sup> The 067 Patent is a continuation of the 642 Patent with the same relevant disclosure. Appx229. Sage generally cites the 642 Patent.

Appx228; Appx249.<sup>5</sup> ***Though the Board ignored the distinction***, the patents explain the difference between a “product” and “article”: “a sterilized chlorhexidine *product*...comprises a *package...and* a chlorhexidine article.” Appx216(3:35-37); Appx3471-3472.

**Dependent Claims 7-8 and 17-18 (“Colorant Claims”)** recite that the sterilized CHG composition comprises an additive from a group including “a sterilized colorant.” Appx228; Appx249.

**Dependent Claims 10 and 20** of the 642 Patent and **Claims 10 and 19** of the 067 Patent (**“SAL Claims”**) recite that the “sterilized article” has a “sterility assurance level of from  $10^{-3}$  to  $10^{-9}$ .” Appx228; Appx249. “‘SAL’ means the probability of a chlorhexidine article...being in a non-sterile condition after [it]...has been subjected to a sterilization process....” Appx222(16:38-46); Appx3475-3476.

Importantly, the patents do not conflate the terms “sterile” and “sterilized.” Appx3473-3476. Rather, the patents explain that to be “sterilized,” a product or component is ***subjected to suitable processing to render it sterile***:

[T]hroughout this disclosure, description that accompanies the terms the chlorhexidine article, or components and compositions thereof, *may be referred to as the ‘sterilized’ component or composition upon being exposed to suitable processing where such sterility can be validated....*

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<sup>5</sup> The main difference between the two patents is the recitation of a receptacle (642 Patent) or barrier (067 Patent) that is compromised to impregnate the applicator.

Appx216(3:56-63). The patents similarly state that the article “undergoes a sterilization process...to form a sterilized chlorhexidine article” and “may be *subjected to any sterilization process suitable to sterilize the chlorhexidine article 14 such that the sterility of the chlorhexidine article 14 can be validated.*” Appx222(16:11-17). “In the context of this disclosure, when the chlorhexidine article 14 is sterilized, the components of the chlorhexidine article 14 *are in a sterile condition*, and that *sterile condition has been validated*, the resultant article is referred to as a *sterilized* chlorhexidine article....” Appx222(16:21-25). Validation “ensures that the sterility processing achieves its intended goal—to consistently render the item sterile.” Appx3474-3475(¶¶118-119), Appx3489(¶152), Appx3468(¶102); Appx1750.

The patents describe various sterilization processes for sterilizing the products, articles, *and* CHG composition and explain how sterility may be validated. Appx222-227(16:11-17:13, 19:14-25:64), Appx216(3:60-63), citing Appx1737-1780; Appx3474, Appx3477.

The distinction between “sterile” and “sterilized” was confirmed during prosecution of the parent application. There, the record was clarified to confirm “sterilized” meant “the article/product must first be subjected to a sterilization process” to be “sterilized” after the PTO initially contended that antiseptics were inherently “sterile” (and thus “sterilized”). Appx3249, Appx3268-3275, Appx3282;

Appx3479-3480.

Moreover, the prosecution of both patents confirmed that the *combination* of a *sterilized product* comprising a *sterilized CHG composition* was what was novel over the prior art (*including Degala, Margoosian, and the Scholz specification*, Appx208-209):

The following is an examiner’s statement of reasons for allowance: the prior art does not teach a product *which is necessarily itself sterilized and* comprising sterilized chlorhexidine gluconate as *further* recited in the claims.

Appx1142-1143; Appx3478; *see* Appx1279.

### **III. BD’S 2019 RELEASE OF FULLY-STERILIZED CHLORAPREP**

In 2019, BD launched its “new,” fully-sterilized ChloraPrep embodying the 642/067 claims. Appx4005-4006; Appx4545-4546. At launch, BD described the “difficult challenge” of sterilizing antiseptics, stating it “overcame the ‘impossible’” with “6 years” of effort costing “millions of dollars.” Appx3065-3068; Appx3484-3485. BD stated “[c]onventional terminal sterilization processes...are not compatible with...CHG and can damage the chemical integrity of the active ingredient.” Appx3065.

### **IV. BOARD PROCEEDINGS**

#### **A. BD’s Petitions**

BD’s Petitions presented three grounds of unpatentability: (1) anticipation by PAR; (2) obviousness over PAR alone; and (3) obviousness over PAR and Degala.

Appx6007-6008. The Petition *never contended* that any secret in-house knowledge or BD manufacturing process had any bearing on the IPR. To the contrary, BD acknowledged it had a prior use defense that was “not eligible for inclusion.” Appx6086,n.20; Appx6166-6167.

**In Ground I**, for the independent claims, BD contended that PAR disclosed a “sterilized” product/article comprising a “sterilized [CHG] composition” because PAR used the word “sterile” to describe the “applicator” and “solution” components. Appx6043-6046, Appx6050. Conflating “sterile” and “sterilized,” BD rejected the notion that sterilization processing was required (a dispute before the district court), asserting only a “sterile condition” was necessary. *Id.*; Appx3155-3156(119-122); Appx6431-6432; Appx3163-3168; Appx6351. Thus, BD identified no teaching in PAR that any product or component had been subjected to sterilization processing. And, importantly, BD *never relied on any “regulatory standards”* for understanding “sterile.” Appx6043-6046.

For the Colorant Claims, BD argued that PAR disclosed a “sterilized colorant” because “the [CHG] solution including the tint is sterile.” Appx6061-6062. BD cited nothing that stated that the *colorant* was “sterile” or “sterilized.” *Id.*

For the SAL Claims, because PAR did not teach *any* SAL, BD argued inherent anticipation, asserting that, “[u]nder relevant regulations [namely, British Standard EN556-1] applicable to medical devices, to describe the medical device and its

components as ‘sterile,’ they must have an [SAL] of  $10^{-6}$ .” Appx6062-6063. BD did not mention that ChloroPrep is a “*medicinal product*”—not a “medical device.” Appx1521.

**In Ground II**, BD’s obviousness arguments for the independent claims amounted to a *single paragraph* that it was “obvious to a POSA that a product described as ‘sterile’ in a regulatory document such as a PAR must have each component subjected to validated sterility processing..., given the relevant requirements in the relevant UK standards....” Appx6069. ***BD did not reference any prior art or general knowledge in the art. Id.*** BD’s “evidence” was a paragraph from its expert’s declaration parroting its statement. Appx1378-1379(¶144).

For the SAL claims, BD argued that an SAL of  $10^{-6}$  was a regulatory “requirement for describing a product...as ‘sterile’” and it was “obvious to a POSA to sterilize the claimed components to the required SAL.” Appx6069-6072. BD did not identify *any* prior art disclosing any method to sterilize a chlorhexidine *article*—much less achieve this SAL. *Id.*

**In Ground III**, BD described Degala’s CHG sterilization method but never argued that a POSA would modify PAR in view of Degala. Appx6073-6075, Appx6079. Rather, BD argued that Degala suggested that ***PAR*** taught the invention, i.e., that it was “obvious to a [POSA] that:” (1) “the sterile applicator and composition *in the ChloroPrep PAR*, in light of Degala, *satisfies the claim limitation*



relating to a sterilized CHG product...;” and (2) as “a medical device required to meet international standards regarding sterility..., ...the sterile applicator and sterile composition *in the ChloroPrep PAR satisfies the limitation...*” Appx6074-6075. BD never contended that Degala taught a sterilized *product/article* or explained how Degala taught sterility validation. *Id.*

For the Colorant Claims, though no colorant was mentioned, BD contended that Degala’s sterilization method “can be applied more generally to ‘medicaments, chemical compositions, cleansing agents, cosmetics, or the like.’” Appx6077-6078.

For the SAL Claims, BD cited Degala’s reference to the SAL of a CHG *solution* (Appx6076-6077), ignoring that the claims require the “chlorhexidine *article*” have the recited SAL. Appx228; Appx3526-3527, Appx3560-3561.

## **B. Institution Decisions**

The Board instituted trial, preliminarily construing “sterilized” to mean that “the component or composition has been subjected to a suitable sterilization process such that sterility can be validated,” citing the patents. Appx6193; Appx7191.

Regarding Ground I, the Board determined:

There appears to be insufficient evidence at this stage of the proceeding to show that the [CHG] composition in ChloroPrep PAR was subject to a separate sterilization process that would allow for validation of the sterility of the composition.... ChloroPrep PAR states that its composition was “sterile,” but per our preliminary claim construction ‘sterile’ is not equivalent to “sterilized.”

Appx6204; Appx7202. The Board recognized “the art at the time states that microbial compositions such as [CHG] ‘are generally not terminally sterilized.’” Appx6204-6205, citing Scholz. It also cited evidence showing that POSAs would not understand PAR to describe a sterilized product, acknowledging confusion at the time over the term “sterile.” Appx6203-6206; 7200-7203. The Board, however, instituted based on Grounds II and III. Appx6213-6216.

### C. Sage’s Responses

Sage’s Patent Owner Responses were accompanied by Declarations of Dr. Rutala (Appx3424-3684; Appx3685-3994), a recognized expert in the field of antiseptics with decades of sterilization experience (Appx3430-3439; Appx3587-3684).

Sage addressed the level of skill in the art, contending that knowledge of challenges surrounding chlorhexidine sterilization was required. Appx6348-6349. Sage explained that BD’s expert (who had *no experience* with antiseptics or CHG) was not a POSA. Appx6348-6349; Argument(§III).

Regarding **Ground I**, Sage explained why a POSA would not understand “sterile” in the 2010 PAR (before *any* CHG sterilization methods had been described in the art) to mean “sterilized” as required by the claims. Appx6354-6366, citing Appx3494-3509, Appx3513-3515. Sage explained how the specification and prosecution history required the “sterilized” product, article, and composition to be

subjected to a suitable sterilization process such that sterility can be validated. Appx6351-6353; Appx3489-3493; *see* Statement of Case (“SOC”) §II. Sage explained how the Petitions conflated “sterilized” and “sterile” and how PAR did not satisfy the “sterilized” limitations because it did not describe *any* product, article, or composition subjected to any sterilization process (much less a validated one). Appx6353-6355, citing Appx3494-3499. Sage further explained how BD ignored the requirement that *both* the article/product *and* CHG composition contained within it be sterilized, which was important to patentability during prosecution. Appx6356-6357, citing Appx1143; Appx3503. Sage showed how ChloroPrep had been mislabeled “sterile” though not fully “sterilized.” Appx6339-6440, Appx6358-6360; SOC(§I.B.).

Regarding the Colorant Claims, Sage explained how PAR taught that the dye was in a “dyed pledget” (in the foam applicator head) *not* in the “sterile...solution” as BD asserted. Appx6365; Appx1526, Appx1529; Appx3523-3525(¶¶268-276).

Regarding the SAL Claims, Sage explained how PAR never mentioned any SAL (or any governing “regulations” for SAL). Appx6366-6378; Appx3525-3534. Sage further provided evidence that BS-EN556-1 was “voluntary” and applied to “medical devices” and not “medicinal products,” *which is how chlorhexidine antiseptics such as ChloroPrep were classified*. Appx6367-6368, citing Appx4462-4536; Appx1521; Appx3529-3532.

Sage also explained that the PAR was not enabling. Appx6369-6371, citing Appx3534-3537.

Regarding **Ground II**, Sage addressed BD's one-paragraph obviousness argument regarding "regulatory standards." Appx6372-6375. Sage submitted un rebutted evidence from Dr. Rutala, who explained how sterilization of antiseptics was a nascent field and developing sterilized chlorhexidine products that could consistently and reliably deliver a sterilized CHG composition remained an unsolved challenge. Appx3537-3552; SOC(§§I.A.&C.). Sage explained how BD *itself* had successfully argued to the Board that Margoosian "results in a solution that is not sterile," and "nowhere does Margoosian provide any reasonable expectation that such a [sterile] solution could be successfully obtained." Appx6377, citing Appx4428-4429; Appx4438-4441; Appx4448-4454; Appx3463-3464; SOC(§I.C.).

Regarding **Ground III**, Sage explained how Degala did not teach a sterilized *product/article* (let alone one with the claimed SAL), a CHG composition subjected to a sterilization process *such that sterility can be validated*, or a sterilized colorant. Appx6381-6387, citing Appx3552-3567. Sage explained why BD's proposed motivation was nonsensical and how the Petition failed to demonstrate success was reasonably expected given the known difficulties. Appx6387-6390, citing Appx3568-3571.

Sage also submitted evidence of objective indicia of non-obviousness. Appx6391-6401, citing Appx3572-3585; Argument(§VII.).

#### **D. BD's Replies**

BD did not provide any expert testimony or other evidence rebutting Dr. Rutala's testimony on the state of the art, challenges in the field, non-enablement, or any other issue regarding what *a POSA* would know. Rather, BD raised new theories and attempted to bolster its inadequate contentions with irrelevant, *non-POSA* evidence.

For **Ground I**, to buttress PAR's inadequate disclosure, BD newly argued that it "sold a sterilized CHG product...in the UK" in 2010, submitting *confidential* information about its *secret* manufacturing and regulatory approval processes for its *UK ChloroPrep product* and citing two employee declarations. Appx6435, Appx6441-6445, citing Appx2559-2676, Appx2276-2285, Appx2258-2266. Neither employee had personal knowledge to discuss these topics. *See* Argument(§IV.A.4.). And BD presented no evidence that anyone outside of the employees—much less any *POSA*—knew about any alleged "sterilized" UK ChloroPrep product in 2010. *Id.* For **Grounds II and III**, BD pressed new theories of obviousness based on previously-unarticulated prior art and new motivations. Appx6452, Appx6454.

### E. Final Written Decisions

The Board’s Final Written Decisions found against Sage on all three grounds based on many new, surprise theories—including ones that were never articulated by BD (even on Reply).<sup>6</sup> In doing so, the Board ignored that new unpatentability theories not presented in the Petitions should be rejected. *See, e.g.*, Appx6503, Appx6509-6512, Appx6515-6518, Appx6520-6523, Appx6527, Appx6375-6376.

The Board did not require POSAs to be familiar with CHG sterilization challenges, finding that BD’s expert, who had no prior experience with chlorhexidine or ChloraPrep, was competent to opine. Appx18. The Board did, however, require POSAs to know about *UK regulations governing ChloraPrep*—a position no party advocated. Appx41-42.

Regarding **Ground I**, the Board changed course from its Institution Decisions, finding that “sterile” in PAR now meant “sterilized” based entirely on materials outside the four corners of PAR. The Board again construed “sterilized” to mean “subjected to a suitable sterilization process such that sterility can be validated.” Appx12. The Board then determined that a “sterilized [CHG] composition” was inherently disclosed based on *British Standards* (acknowledging that the Petition *never presented this argument* for the independent claims,

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<sup>6</sup> The Final Written Decisions are substantively similar, and Sage cites to the record in IPR2021-01201.

Appx28,n.7). Appx28-35; Appx62-63. The Board repeatedly cited *confidential* information about BD’s internal manufacturing process and regulatory procedures for the ChloroPrep UK *product* to fill in what was missing *from PAR*. Appx30-31. The Board also theorized about “knowledge...in the art” that *could* be applied to PAR, namely, “terminally sterilizing” chlorhexidine products using ethylene oxide (though PAR never mentions terminal sterilization or ethylene oxide and no POSA suggested it) and referenced Chiang (a reference not included in the Petition) to further buttress its theories. Appx25-28.

For the Colorant Claims, the Board acknowledged that “the dye...is not initially stored...with the CHG composition” (Appx59-60)—the basis of BD’s anticipation theory (Appx6061). Yet, the Board concocted its own new ground, finding the dye was nevertheless “sterilized”—exactly how is unclear. Appx61-62.

Regarding **Ground II**, the Board did not address Petitioner’s *petitioned* obviousness grounds based on PAR *alone*, but instead created new theories based on *Degala*, *Scholz*, and *Chiang*. Appx72. The Board justified its new art combinations because a POSA “is presumed to know the relevant prior art” (Appx76-77), ignoring well-established precedent that it cannot manufacture new obviousness combinations for petitioners. The Board provided no motivation for its new combinations and explicitly refused to consider Sage’s arguments that the

disproven alleged sterilization of Margoosian undermined expectations of success. Appx66-77; Appx73,n.15.

Finally, in **Ground III**, the Board ignored that Degala failed to teach a sterilized chlorhexidine *product/article* or a CHG composition subjected to a *validated* sterilization process or Sage's unrefuted arguments regarding the lack of expectation of success. The Board instead created new theories including modifications and motivations to combine Degala and PAR never presented by the Petition. Appx93. For the Colorant and SAL Claims, the Board ignored BD's *petitioned* grounds based on *Degala*, finding the claims obvious based on its *PAR* theories. Appx96-97.

### SUMMARY OF THE ARGUMENT

The Board committed numerous legal and factual errors in finding unpatentability. When faced with Sage's evidence refuting BD's *petitioned grounds*, the Board changed course, manufacturing new grounds and theories and finding the claims unpatentable in view of them. In the end, *there was no record evidence* of *any* cited art that disclosed (i) a sterilized chlorhexidine *product or article*, (ii) a CHG composition subjected to a *validated* sterilization process, (iii) a *sterilized colorant*, or (iv) the SAL of any sterilized *product/article*. These elements were all manufactured based on the Board's "knowledge."



The Board erroneously misdefined the level of skill in the art, infecting its analysis on all three grounds. The Board incorrectly determined that POSAs need not know about challenges in sterilizing chlorhexidine antiseptics, but demanding knowledge about UK regulatory requirements governing ChloroPrep (though neither party suggested it).

The Board erred in finding anticipation by PAR in Ground I. The four corners of PAR indisputably did not disclose a “sterilized” product, article, or CHG composition. The Board exceeded its authority, finding anticipation based on theories not presented in the Petition. The Board erroneously filled in missing elements based on newly-contrived POSA “knowledge,” previously-uncited references, and *confidential non-POSA* testimony about BD’s UK ChloroPrep *product*. The Board’s enablement analysis likewise ignored PAR’s lack of disclosure.

For Ground II, the Board again disregarded the *petitioned* grounds and instead exceeded its authority by analyzing whether it was obvious to modify PAR in view of prior art never referenced in Ground II. But even the Board’s new combinations never taught a sterilized chlorhexidine product/article, sterilized CHG composition, a sterilized colorant, or the claimed SAL.

For Ground III, the Board once again manufactured new theories, ignoring that Degala failed to teach a sterilized *product/article* or a CHG composition

subjected to a process *such that sterility can be validated*. And even the new theories ignored whether success would be reasonably expected. The Board further erred in ignoring BD's *petitioned* theories of obviousness of the Colorant and SAL Claims, which were plainly wrong.

Finally, though the Board found a nexus between the overwhelming objective indicia evidence and the claimed invention, the Board conducted a backwards analysis and legally erred by dismissing it.

The Board committed numerous legal errors and its findings are not supported substantial evidence. This Court should reverse the Board's determinations.

## **ARGUMENT**

### **I. STANDARDS OF REVIEW**

This Court reviews the Board's compliance with "legal standards *de novo* and its underlying factual determinations for substantial evidence." *Randall Mfg. v. Rea*, 733 F.3d 1355, 1362 (Fed. Cir. 2013). Substantial evidence review focuses on "whether a reasonable fact finder could have arrived at the agency's decision, which requires examination *of the record as a whole*, taking into account evidence that both justifies and detracts from an agency's decision." *Pers. Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 991 (Fed. Cir. 2017).

"Whether the Board improperly relied on new arguments is reviewed *de novo*." *In re IPR Licensing, Inc.*, 942 F.3d 1363, 1369 (Fed. Cir. 2019). This Court

reviews “compliance with the Administrative Procedure Act (‘APA’) *de novo*....” *EmeraChem Holdings, LLC v. Volkswagen Grp. of Am., Inc.*, 859 F.3d 1341, 1345 (Fed. Cir. 2017).

“The Board’s finding regarding the level of skill in the art is a question of fact...review[ed] for substantial evidence.” *Best Med. Int’l, Inc. v. Elekta Inc.*, 46 F.4th 1346, 1353 (Fed. Cir. 2022).

Anticipation is a question of fact reviewed for substantial evidence. *HTC Corp. v. Cellular Commcn’s Equip., LLC*, 877 F.3d 1361, 1367 (Fed. Cir. 2017).

Obviousness is a question of law reviewed *de novo* with “underlying factual determinations...reviewed for substantial-evidence support.” *St. Jude Med., LLC v. Snyders Heart Valve LLC*, 977 F.3d 1232, 1238 (Fed. Cir. 2020).

Based on underlying factual findings, this Court “reviews the Board’s ultimate conclusion that a reference is or is not enabling without deference.” *In re Morsa*, 803 F.3d 1374, 1376 (Fed. Cir. 2015).

## **II. THE BOARD REPEATEDLY EXCEEDED ITS AUTHORITY BY FINDING UNPATENTABILITY BASED ON NEW THEORIES NEVER PRESENTED IN BD’S PETITION**

As explained *infra*, *in every single ground*, the Board dodged Sage’s responses to the *petitioned* grounds by relying on new grounds for unpatentability, citing art, POSA “knowledge,” or other “evidence” never presented in BD’s Petition. This legal error permeated the Board’s Decisions and mandates reversal.

It is well-established that the Board does not “enjoy[] a license to depart from the petition and institute a *different* [IPR] of [its] own design.” *SAS*, 138 S.Ct. at 1356 (emphasis original). Constrained by the statutes and regulations governing IPRs (e.g., 35 U.S.C. §§311(a), 312(a)(3), 314(b), 37 C.F.R. §42.23(b), and the APA (e.g., 5 U.S.C. §554(b)-(c)), the Board cannot “initiate whatever kind of [IPR] [it] might choose.” *Koninklijke Philips N.V. v. Google LLC*, 948 F.3d 1330, 1335 (Fed. Cir. 2020); *EmeraChem*, 859 F.3d at 1349. Rather, “the petitioner’s contentions...define the scope of the litigation all the way from institution through to conclusion....” *SAS*, 138 S.Ct. at 1357. Thus, the Board is not “free to adopt arguments on behalf of petitioners that could have been, but were not, raised by the petitioner....” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1381 (Fed. Cir. 2016). That is why it is of “utmost importance that petitioners...adhere to the requirement that the *initial petition* identify ‘with particularity’ the ‘evidence that supports the grounds for the challenge to each claim.’” *Intelligent Bio-Sys. v. Illumina Cambridge*, 821 F.3d 1359, 1369 (Fed. Cir. 2016); PTAB Consolidated Trial Practice Guide 73 (Nov. 2019) (addressing limited scope of reply).

Based on this well-settled law, this Court has repeatedly reversed where the Board deviated from the petitioned grounds and acted outside its authority by presenting new reasons for unpatentability. *Koninklijke*, 948 F.3d at 1335 (Board erred in instituting on new art combinations not in petition); *Magnum*, 829 F.3d at

1381 (reversing Board where it relied on new theory based on art cited as motivation for obviousness); *EmeraChem*, 859 F.3d at 1352 (vacating Board where it “denied [patentee] its procedural rights guaranteed by the APA” by citing prior art petitioner relied on in a different context); *IPR Licensing*, 942 F.3d at 1370 (reversing Board where it “cited...arguments under ground three” for unpatentability under ground one); *Oren Tech., LLC v. Proppant Express Investments LLC*, No. 2019-1778, 2021 WL 3120819, at \*5 (Fed. Cir. July 23, 2021) (reversing Board where it “repurpos[ed]” a theory advocated for a different limitation); *M&K Holdings v. Samsung Elec. Co.*, 985 F.3d 1376, 1385 (Fed. Cir. 2021) (Board “deviated impermissibly from the invalidity theory set forth in...petition”); *cf. Intelligent*, 821 F.3d at 1369 (affirming Board’s rejection of new reply arguments). The Court should do the same here.

### **III. BECAUSE THE BOARD APPLIED AN ERRONEOUS POSA DEFINITION, ITS DECISIONS ARE LEGALLY FLAWED**

The Board erroneously determined that a POSA need *not* understand challenges in sterilizing chlorhexidine products but *would* know UK regulatory requirements for UK ChloroPrep in 2010. The Board’s failure to apply the correct skill level was erroneous, requiring reversal of the Board’s anticipation and obviousness findings. *Mintz v. Dietz & Watson, Inc.*, 679 F.3d 1372, 1376-77 (Fed. 2012); *Ruiz v. A.B. Chance Co.*, 234 F.3d 654, 667 (Fed. Cir. 2000).

First, the Board erred in not requiring a POSA to know about challenges in sterilizing chlorhexidine antiseptic products. Sage emphasized that “the definition of a POSA is important here as a POSA with familiarity with antiseptics and chlorhexidine *would be aware of the challenges facing practitioners.*” Appx6348-6349, citing Appx3486-3487(¶144). Indeed, the patents-at-issue focus on challenges *with sterilized chlorhexidine products.* Appx215(1:15-47).

BD’s expert (Dr. Dabbah) was “not aware” of “any problems that needed to be overcome” to develop sterilized chlorhexidine products/articles, believing “there was nothing unique about sterilization of [CHG].” Appx1334(¶40), Appx1348(¶73). This was unsurprising because Dabbah had *no experience* with such products:

Q. You do not identify yourself as an expert in antiseptics?

A. Correct. \*\*\*

Q. ...[Y]ou don’t recall ever working with chlorhexidine gluconate?

A. Specifically, no.

Q. And you do not recall specifically working with an antiseptic product correct?

A. Correct. \*\*\*

Q. ...Prior to this case, had you ever read or reviewed any articles about chlorhexidine gluconate?

A. No, that I recall.

Q. Prior to this case, had you ever investigated the properties of CHG?

A. No, prior to that case. \*\*\*

Q. Were you aware of the ChloroPrep line of products before this case?

A. No.

Appx3954, Appx3981-3982(37:13-15, 38:2-17), Appx3987(43:8-19).

Despite his lack of knowledge, the Board repeatedly credited Dabbah as a POSA on issues relating to **CHG**. *See, e.g.*, Appx61, Appx72 (Dabbah testimony that POSA could sterilize CHG though Dabbah never worked with CHG), Appx92-93 (Dabbah testimony that Degala “expressly references” the UK ChloroPrep product though Dabbah never heard of ChloroPrep). The Board erred by not including knowledge of challenges in its POSA definition and ignoring Dabbah’s inability to credibly opine as a POSA. *Mintz*, 679 F.3d at 1376; *Kyocera Senco Indus. Tools Inc. v. ITC*, 22 F.4th 1369, 1377-78 (Fed. Cir. 2022); *Flex-Rest, LLC v. Steelcase, Inc.*, 455 F.3d 1351, 1360-61 (Fed. Cir. 2006).

Second, the Board exceeded its authority by requiring POSAs to understand UK regulatory requirements ***though neither party suggested it***. Appx6031, Appx6348-6349; Argument(§II.). Specifically, citing nothing in the patents, the Board stated its “definition of the POSA reflects” that POSAs “would have been *aware of regulatory differences* between the U.S. and the U.K....” Appx42. And, in every ground, the Board’s findings were premised on its unsupported assumption that POSAs know how UK regulatory requirements *applied to BD’s UK product* though no POSA did:

- “[POSA] would understand the term ‘sterile’ as used in a U.K. regulatory document,...to mean ‘sterilized’....” Appx28, Appx43.
- “[POSA] would have understood that the product described in the ChloroPrep PAR was required to comply with applicable standards, including BS EN-556-1....” Appx29.
- “POSA would ‘immediately understand...that U.K. and European standards for SAL applied to the ChloroPrep PAR.’” Appx42.
- “[G]iven the UK regulatory requirements, a [POSA] would have been motivated...” Appx74.
- “The distinction between the U.S....and the U.K.’s ChloroPrep product is significant because...countries have different regulations ....” Appx39-40.

Despite the Board’s POSA requirements, Dabbah was *not* a regulatory expert, had no expertise in UK regulatory submissions, and had not previously heard of ChloroPrep. Appx3998, Appx3990, Appx3993, Appx3954. Yet, the Board repeatedly relied on him for those issues. Appx28-29, Appx31-32, Appx34, Appx37, Appx42, Appx68-69, Appx96.

The Board erred by inventing its own level of skill in the art—entirely divorced from the patents—and for not disregarding Dabbah’s unqualified testimony, requiring reversal of its decisions. *Mintz*, 679 F.3d at 1376; *Kyocera*, 22 F.4th at 1377-78.



#### **IV. THE BOARD’S ANTICIPATION FINDING BASED ON PAR SHOULD BE REVERSED (GROUND I)**

All three of BD’s grounds hinged on PAR, but PAR fails to disclose numerous claim elements. Though the industry struggled with sterilizing antiseptic products through the mid-2010s, the Board concluded that PAR described the solution years earlier. The Board’s anticipation determination was not based on a plain reading of *PAR* (which does not mention sterilization), but is instead predicated on improper *combinations* of PAR and other documents/information not referenced in the Petition, and should be reversed.

##### **A. The Board Legally Erred In Finding The Independent Claims Anticipated**

Independent Claims 1 and 12 recite a “sterilized chlorhexidine product” or “sterilized chlorhexidine article” in which the product/article *further* comprises a “sterilized [CHG] composition” component and an applicator component. Appx228; Appx249. The claims were allowed (including over ChloroPrep prior art) because “the prior art does not teach a *product* which is necessarily *itself* sterilized *and* comprising sterilized [CHG] as *further* recited in the claims.” Appx1143; Appx1279. Yet, PAR disclosed neither limitation. The Board erred in relying on materials outside PAR to “establish” that it did.

# 1. PAR Never Disclosed A “Sterilized” Product, Article, Or Composition

The Board purported to construe “sterilized” to mean “the article/component/composition...has been subjected to a suitable sterilization process such that sterility can be validated.” Appx12. But nothing *in the four corners of PAR* suggested that any article/component/composition had been subjected to such a process. Appx1520-1543; Appx3501. The Board improperly found “anticipation” by reaching far beyond PAR and the *petitioned* arguments to fill the gaps.

BD’s Petition argued that PAR disclosed a “sterilized product/article” and “sterilized [CHG] composition” because PAR referenced “sterile applicators” and “sterile alcoholic antiseptic solution.” Appx6043-6046. Specifically, BD argued that, together, “sterile applicators [limitation 1.b.] and sterile CHG... [limitation 1.a] form a sterilized chlorhexidine product.” Appx6044. ***BD never referenced any “regulatory standards,”*** but instead argued that “sterile” meant “sterilized,” which it claimed meant being in “a sterile condition.” Appx6043-6046; Appx6431; Appx3155-3156; Appx3163.

In response, Sage explained that “sterile” and “sterilized” are not equivalent and that the patents required a “sterilized” product or component be “subjected to a sterilization process such that sterility can be validated.” Appx6350-6356, citing, e.g., Appx216(3:56-61); SOC(§II.). Sage further explained that the “combination”

of the “sterile” applicator component and “sterile” solution component “does not establish that *the product itself* is sterile or sterilized.” Appx6357-6358, Appx6361-6362. Indeed, the prosecution confirmed that “*an individually sterilized component in an article/product does not impart sterility onto the entire article/product....[sterility] results from the article/product as a whole being subjected to a sterilization process.*” Appx3273; SOC(§II.).

The Board disregarded BD’s *petitioned* arguments and Sage’s response focusing on why “sterile” components was inadequate. The Board identified nothing *in PAR* that disclosed *a product/article* “subjected to a sterilization process” (much less a validated one) as purportedly required by its construction. Rather, the Board invented a new theory of unpatentability. Though BD argued that the “applicator” component of PAR was “sterile,” the Board concluded that “the *entire ChloraPrep with Tint product* has been sterilized,” theorizing that the “entire product” *can* be “terminally sterilized” with “ethylene oxide.” Appx25-26. But there was *no reference* to “terminal steriliz[ation]”—much less “ethylene oxide gas to achieve sterilization” of “the entire product” in *PAR*. The Board invented this sterilization theory as a *possible* way in which sterilization *could be* done without any evidence in PAR for doing so. *Id.*; Argument(§§IV.A.1.&VI.B.1.).

The Board concluded that its new theory that “the entire ChloraPrep with Tint product [2010 UK] has been sterilized is supported further by what *Chiang* [a 2014

publication never cited in the Petition, Appx6014-6016] teaches was known” about “ChloraPrep,” discussing *Chiang* for several pages. Appx25-27. The Board then criticized Sage for “not specifically discuss[ing]” this previously-uncited aspect of *Chiang*. Appx27.

Moreover, despite finding anticipation, the Board erroneously never analyzed the different claim terms in Claims 1 and 12 (“sterilized *product*” versus “sterilized *article*”) (Appx53), one of which requires *the packaging itself* to be sterilized. Appx216(3:35-37); Appx3471.

The Board made similar leaps in concluding that PAR disclosed “a ***sterilized [CHG] composition***” because PAR referenced a “sterile...solution.” Appx37. No sterilization process was referenced in PAR, and nothing in PAR suggested that it described anything other than an antiseptic acting as an antimicrobial. Appx3494-3499, Appx3507-3509. Notably, despite relying on *Chiang* to find the “ChloraPrep *product*” was sterilized, the Board inconsistently *ignored* *Chiang*’s disclosure that, “[i]n the ChloraPrep® applicator, the sealed glass ampule protects the CHG composition during the sterilization process...which could otherwise compromise the efficacy of the antiseptic.” Appx3330(¶10). The Board also ignored BD’s 2015 FAQ that stated that “the solution inside of the applicators is *not treated with a separate sterilization process* and, therefore, is *not sterile*.” Appx3050.

Knowing that *PAR* does not disclose any product/article/composition “subjected to a suitable sterilization process such that sterility can be validated,” the Board imported that disclosure based on the “knowledge of a POSA.” *Again advancing grounds never articulated* for the independent claims (Appx6043-6046), the Board concluded that “a [POSA] would understand the term ‘sterile’ as used in a U.K. regulatory document...to mean ‘sterilized’” because “PAR needed to comply with applicable regulations.” Appx28-29. The Board then discussed—at length—why a POSA would supposedly know that BS-EN556-1 (Appx1951-1962)—a document not referenced in PAR and addressing sterilization of “medical devices”—would require a “validated” “sterilization process” for “medicinal products” such as ChloroPrep. Appx29-34; Argument(§IV.A.5).

To anticipate, prior art “must disclose all elements...within the four corners of the document...” *Microsoft v. Biscotti*, 878 F.3d 1052, 1068 (Fed. Cir. 2017). The four corners of PAR indisputably do not disclose that any product, article, or CHG composition has been sterilized, i.e., “subjected to a suitable sterilization process such that sterility can be validated.” Appx1520-1543; Appx3494-3509. Indeed, the *Petition never alleged that sterilization processing was required* by the term “sterilized”—much less that PAR disclosed it, relying instead on conflating “sterilized” and “sterile.” Appx6043-6046. The Board’s anticipation analysis, based on materials outside of PAR, was flawed as a matter of law, not supported by

substantial evidence, and should be reversed. *Microsoft*, 878 F.3d at 1068; *In re Hodges*, 882 F.3d 1107, 1113 (Fed. Cir. 2018).

## **2. The Board Erred In Inventing New Grounds Of Anticipation**

The Board exceeded its authority by finding anticipation based on new theories not presented in the Petition. Argument(§II). The Petition never contended that *any* regulatory standard was relevant to understanding the term “sterile” in PAR for the independent claims, never cited Chiang, and never argued that PAR disclosed “ethylene oxide” sterilization of the entire “product” based on “general knowledge.” Appx6043-6046. Indeed, the Board acknowledged that its “regulatory standard” theories stemmed from arguments “in *dependent claims*” and its ethylene oxide theory was based on *enablement* arguments. Appx28&n.7.

But the Board was not “free to adopt arguments on behalf of petitioners that could have been, but were not, raised by the petitioner....” *Magnum*, 829 F.3d at 1381. Thus, the Board legally erred in relying on new theories of anticipation not in the Petition. Argument(§II); *IPR Licensing*, 942 F.3d at 1369 (Board erroneously relied on certain “standards” to find unpatentability where petition relied on them for a different ground); *EmeraChem*, 859 F.3d at 1352 (APA violation where Board relied on art cited for different grounds); *Oren*, 2021 WL 3120819, \*5 (Board improperly “repurpos[ed]” “motivation” theory for a different issue).

### 3. The Board Erred In Finding Missing Limitations In Other References And POSA “Knowledge”

“[A] patent claim can only be invalid for anticipation if a single reference discloses each and every limitation of the claimed invention.” *Galderma Labs. v. Teva Pharm. USA*, 799 F.App’x 838, 844 (Fed. Cir. 2020). This Court has “made clear that anticipation does not permit an additional reference to supply a missing claim limitation.” *Teleflex, Inc. v. Ficoso N. Am. Corp.*, 299 F.3d 1313, 1335 (Fed. Cir. 2002). Here, the Board improperly filled gaps of missing elements (“sterilized product[article]” and “sterilized [CHG] composition”) using “regulatory standards,” Chiang, and “knowledge,” implicitly applying the doctrine of inherency. But to establish inherency, BD must establish POSAs would recognize “the missing descriptive matter is ***necessarily present*** in the thing described in the reference.” *Cont’l Can Co. USA v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991). The Board cannot “fill in missing limitations” even if a POSA would “immediately envision them.” *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Ltd*, 851 F.3d 1270, 1274-75 (Fed. Cir. 2017).

In *Kingston Tech. Co., Inc. v. SPEX Techs., Inc.*, 798 F.App’x 629, 633-34 (Fed. Cir. 2020), the Court found no inherent anticipation where the prior art mentioned a standard, but did not incorporate the standard by reference or require compliance, finding petitioner’s attempt to incorporate the standard “relie[d] on multiple inferential leaps.” Here, the Board likewise erred in concluding that PAR

*necessarily* disclosed “sterilized” products/articles containing “sterilized” CHG compositions when PAR made no reference to *any* regulatory standard supposedly governing sterilization or the word “sterile” (e.g., BS-EN556-1)—much less “Chiang” or “ethylene oxide” sterilization supposedly known in the art.

The Board’s “multiple inferential leaps” are particularly problematic given the un rebutted evidence that POSAs would not have understood the bare use of the word “sterile” in a 2010 document describing an antiseptic product—especially ChloraPrep—to mean that it had been *sterilized*. Appx3494-3499. Despite the Board’s conclusions, the substantial evidence of record established that the word “sterile” on an antiseptic (particularly ChloraPrep) had questionable meaning given the US ChloraPrep product was mislabeled as “sterile” and there was *no prior art* describing methods of sterilizing CHG by 2010. SOC(§§I.B.-C.); Appx3496-3499; Appx5114-5115 (questions as late as 2015).

#### **4. The Board Erred In Relying On Confidential Information About BD’s Alleged UK Product**

The Board compounded its errors by finding anticipation based on BD’s employee declarations and documents about BD’s ChloraPrep UK *product* and its corollary *confidential* manufacturing process and regulatory approval.

An IPR can be instituted “only on the basis of prior art consisting of patents or printed publications”—not products. 35 U.S.C. §311(b). Thus, a “Petitioner cannot combine the teachings of a printed publication with the operations of an



actual system that was on sale or in public use....” *Red Hat v. Elec. & Telecomm. Res. Inst.*, IPR2019-00465, 2019 WL 2488036, \*9 (P.T.A.B. June 13, 2019); *Capsugel Belgium NV v. Innercap Techs.*, IPR2013-00331, 2013 WL 8595288, at \*9 (P.T.A.B. Dec. 9, 2013). Likewise, declarations about what was “known...cannot be applied, independently, as teachings separately combinable with [prior art].” *Dominion Dealer Solutions v. Autoalert*, IPR2014-00684, 2014 WL 5035359, \*5 (P.T.A.B. Oct. 6, 2014). Moreover, confidential information is not relevant to the knowledge of a *POSA*. *Biogen Int’l GMBH v. Mylan Pharms. Inc.*, 18 F.4th 1333, 1346 (Fed. Cir. 2021). Rather, the “fundamental issue” is the knowledge of a *POSA*—not a particular individual’s knowledge. *SIBIA Neurosciences, Inc. v. Cadus Pharm. Corp.*, 225 F.3d 1349, 1358 (Fed. Cir. 2000).

The Board nevertheless repeatedly relied on BD’s employees and non-POSAs (offered on Reply) about BD’s ***confidential*** manufacturing and regulatory discussions regarding its ***UK product*** as somehow dispositive of what ***PAR*** disclosed, e.g.:

- “Petitioner’s employees confirm that the version of the ChloroPrep product sold in the U.K. had sterilized [CHG].” Appx40-41.
- “Both witnesses...provide...knowledge as to whether the CHG solution in the UK ChloroPrep product was separately sterilized....” Appx41, n.11.

- Citing “multiple witnesses whose testimony supports that BS-EN556-1 applied to the ChloroPrep PAR and that compliance with that standard was ‘required.’” Appx31.

*See also* Appx30, Appx41-42, Appx69, Appx72-74.

The Board’s reliance on this “evidence”—e.g., declarations (Appx2258-2266; Appx2276-2285), confidential manufacturing specifications (Appx2559-2676), and internal email communications (Appx2544)—over Sage’s objections was fundamentally flawed. Appx6513-6514. Not only was this “knowledge” not in the Petition as part of any unpatentability argument (nor could it be, *see supra*), it had no bearing on what **PAR** discloses to a **POSA** as a matter of law.

First, both BD witnesses admitted that they were not POSAs, and neither offered testimony from the perspective of one. Appx5101(22:7-23:6); Appx5171-5172(20:17-21:13).

Second, neither employee had personal knowledge of the pertinent facts. One was not employed with BD at the relevant time, and the other was in marketing and did not know about product manufacturing or regulatory procedures. Appx5170-5172(15,17,20-21), Appx5174-5177(32-33,39,42), Appx5193(106); Appx5101, Appx5103-5108.

Third, the information was not “prior art knowledge” as both employees testified BD’s ChloroPrep UK manufacturing process and regulatory approval

information were *not public* but confidential to BD. Appx2559(“Confidential”); Appx2278-2283(¶¶4,14); Appx5175-5176(35:24-37:18), Appx5188(86-87); Appx5104, Appx5109, Appx5112-5113, Appx5118. BD presented no evidence that anyone outside of its employees knew about this information, and materials were redacted as confidential in the IPR. *Id.*; Appx3954(10:10-12); Appx2404(33:22-34:13).

The Board erred in relying on company confidential information about internal manufacturing and regulatory approval that was not prior art, had *no bearing* on what *PAR* teaches a *POSA*, and could not be part of an IPR as a matter of law.

### **5. The Board’s Reliance On Regulatory Standards To Supplement PAR Was Erroneous**

The Board’s anticipation finding hinged on its new theory that BS-EN-556-1 mandated subjecting components in ChloraPrep PAR to a sterilization process. Appx29-31, Appx41-42. Indeed, the “standards” were the *only* evidence upon which the Board relied to satisfy the claim construction requirement that the sterilization process be “validated” (another new theory). Appx34, Appx47; Appx12. Substantial evidence does not support the Board’s conclusions.

*First*, nothing in PAR stated that any particular “sterilization” standards applied to it, and there was not a shred of *documentary* evidence that BS-EN-556-1 applied to UK ChloraPrep (only uncorroborated testimony). Indeed, the

documentary evidence established that BS-EN556-1 applies to “medical devices”—*not* “medicinal products” like ChloroPrep.

Evidence from the UK regulatory agency (“MHRA”) confirmed that “chlorhexidine antiseptic products...will be classified as a *medicinal product*.” Appx4513-4515. BD’s employees confirmed ChloroPrep was a “medicinal product” and not a “medical device.” Appx5105(40:1-15); Appx5177(44:1-6). *PAR itself* states that ChloroPrep is a “medicinal product.” Appx1521.

The Board acknowledged that MHRA “classifies ChloroPrep as a ‘medicinal product’” and that BS-EN-556-1 applies to “medical devices,” which “*exclude[s]* devices that ‘achieve [their] principal intended action...by pharmacological...means.’” Appx33, citing Appx1957; Appx3531-3532. Nevertheless, without citing POSA evidence, the Board unilaterally concluded that, if “ChloroPrep PAR’s CHG composition is considered to be pharmacological means, we find that the CHG composition assists the applicator in its function, and thus we find the product described in the ChloroPrep PAR falls within the scope of BS-EN 556-1.” Appx33.

But the Board was not free to act as MHRA, speculating about how to reclassify ChloroPrep. Substantial evidence did not support the Board’s theory, and thus it could not establish that PAR *necessarily* disclosed the “medicinal product” in

PAR would be “sterilized” in compliance with “medical device” standards (never mentioned in PAR) to prove inherency. *Kingston*, 798 F.App’x at 633-34.

**Second**, the Board’s keystone finding that BS-EN 556-1 was a *requirement* was directly contradicted by the only documentary evidence on the issue. The British Standards Institute (“BSI”) clarifies that its “standards aren’t the same as regulations” and “[s]tandards are voluntary...tools devised for the convenience of those who wish to use them.” Appx4464; Appx4462; Appx3530-3531. The Board did “not agree” with BSI because “multiple witnesses” testified that “BS-EN-556-1 applied,” citing BD’s irrelevant and uncorroborated employee testimony. Appx31; Argument(§IV.A.4). But, “[t]o contradict a reference, an unsupported opinion is not substantial evidence.” *Ericsson Inc. v. Intellectual Ventures I LLC*, 890 F.3d 1336, 1346 (Fed. Cir. 2018). Moreover, BD’s employee testified that *different* standards applied to “medicinal products” like ChloroPrep. Appx5197-5198.

**Third**, the “standards” do not require “medical devices” be “subjected to a suitable sterilization process” as required by the claim construction, demonstrating that “sterilization” is not “necessarily present” as required for inherent anticipation. According to the standard, a “medical device” may be “sterile” if aseptically processed instead of sterilized. Appx1956; Appx3291-3303; Appx3533(¶¶299-300). The Board concluded that aseptic processing “does not appear to apply to the ChloroPrep PAR” because “there is no evidence that ChloroPrep Par cannot be

terminally sterilized” (Appx34), ignoring Dr. Rutala’s opinions, published statements describing aseptic processing for antiseptics, and statements that CHG products should not be terminally sterilized. Appx3532-3533(¶¶299-300); Appx3013, Appx3020 (FDA discussion of “validated aseptic manufacturing”), Appx3027-3029, Appx3032; Appx3330(¶¶9-10).

The Board’s unsubstantiated new theories, unsupported by substantial evidence, should be reversed.

**B. The Board Erred In Finding The Colorant Claims Anticipated Under Newly-Invented Theories**

The Colorant Claims recite “the sterilized [CHG] composition further comprises...a sterilized colorant.” Appx228; Appx249 (claims 7-8, 17-18). The Petition’s *sole basis* for anticipation was that PAR’s dye was “included within” the “sterile” CHG solution in the glass ampoule and is thus “sterilized.” Appx6061-6062. Sage explained why PAR does *not* disclose that colorant was in the “sterile...solution” as alleged. Appx6365-6366, citing Appx3523-3525. Rather, PAR explicitly described the dye as located in a “dyed pledget”—*not* the glass ampoule. Appx1526, Appx1529. This was consistent with other evidence: “the [ChloroPrep] CHG composition is in a glass ampoule and the dye composition is provided in the foam applicator head” because CHG compositions are “not stable with dye components.” Appx3330-3331(¶13); Appx3466(¶95). BD’s witness

likewise admitted that PAR described the dye in the pledget—not the solution. Appx5111-5112(65:10-12)(“ Q...So the dye is not in the solution? A. No.”).

The Board acknowledged that “evidence of record supports that the dye...is not initially stored in the reservoir with the CHG composition.” Appx59-60 (“the dye...is initially in the pledget rather than...the CHG solution”). But instead of rejecting the Petition’s *sole* argument, the Board once again created its own ground, concluding that the dye “must become an excipient when CHG solution passes through the pledget.” Appx60-61. The Board then concluded all excipients are sterile and therefore “sterilized” (when, how, or by what process was unclear as the theory was invented out of whole cloth). *Id.* The Board reached that conclusion though nobody alleged that the pledget was sterile or sterilized. Appx6061-6062.

The Board exceeded its authority, violating the APA, by inventing its own anticipation theory and finding the claims unpatentable under it—particularly given PAR mentions *no* sterilized (or “sterile”) colorant. Argument(§II.); *Magnum*, 829 F.3d at 1381. The unsupported finding should be reversed.

### **C. The Board Erred In Finding The SAL Claims Anticipated**

The SAL Claims require the sterilized chlorhexidine “product”/“article” to have an SAL “from  $10^{-3}$  to  $10^{-9}$ .” Appx228 (Claims 10&20); Appx249 (Claims 10&19). PAR indisputably does not disclose any SAL. Rather, the Board found inherent anticipation based on the British Standard (never referenced in PAR)

requiring a “[SAL] of  $10^{-6}$ ” for “medical devices” that are “terminally sterilized.” Appx62-63, citing Appx1958. This determination, based on “multiple inferential leaps,” was wrong on many levels and requires reversal. *Kingston*, 798 F.App’x at 633-34; Appx3525-3529.

**First**, as discussed, PAR never disclosed “terminal sterilization,” but instead the Board erroneously hypothesized that the product *could be* “terminally sterilized” with “ethylene oxide” Appx25-28; Argument(§§IV.A.1.&VI.B.1.).

**Second**, as discussed, the Board did not establish that POSAs would *necessarily* determine BS-EN-556-1’s provisions on *medical devices* would apply to the *medicinal product* of PAR such that it is inherently disclosed. Appx3527-3534; Argument(§IV.A.5.). The PAR never references BS-EN-556-1—much less required its standards *on SAL* for *theoretical* “terminal sterilization” of a *medicinal product*. *Kingston*, 798 F.App’x at 633-34.

**Third**, there is no art in the record describing any “*chlorhexidine product/article*” having an SAL of “ $10^{-3}$  to  $10^{-9}$ ”—much less any explanation of how to successfully reach that SAL. This is precisely why the law demands *evidence* to support anticipation rather than general allegations of “knowledge.” *K/S Himpp v. Hear-Wear Techs., LLC*, 751 F.3d 1362, 1365-66 (Fed. Cir. 2014) (evidence is “required to conclude that a structural element is a known prior art element.”).



#### **D. The Board’s Enablement Determination Was Legally Erroneous**

The prior art must “teach [POSAs] to make or carry out the claimed invention without undue experimentation.” *Elan Pharm., Inc. v. Mayo Found.*, 346 F.3d 1051, 1054 (Fed. Cir. 2003). Moreover, “[n]ascent technology...must be enabled with a ‘specific and useful teaching.’” *Chiron Corp. v. Genentech*, 363 F.3d 1247, 1254 (Fed. Cir. 2004).

PAR provided no information regarding *how* to sterilize any chlorhexidine products/articles, components, or colorants or *how* to achieve the claimed SALs. Appx3534-3538. The lack of disclosure is problematic here given the numerous existing challenges surrounding sterilizing chlorhexidine products and compositions. SOC(§§I.A.&I.C.); Appx3448-3451. BD never rebutted Dr. Rutala’s testimony that “the field was nascent” and there was no “clear pathway to develop a sterilized chlorhexidine product and article that was able to contain, deliver, and apply a sterilized [CHG] composition.” Appx3535-3536(¶310).

The Board nevertheless determined *PAR* was enabling because “Degala describes a prior art sterilization process for CHG,” ignoring other non-enabled elements. Appx64-66. The Board, however, conflated obviousness and anticipation by inappropriately importing disclosure from a second reference. *Galderma*, 799 F.App’x at 844 (“[w]e refuse to look to [second reference] to incorporate a specific disclosure not found in [first reference].”) This was legal error as one “must

determine if prior art is enabling by asking whether a [POSA] could make or use the claimed invention...based on the disclosure *of that particular document.*” *In re Morsa*, 713 F.3d 104, 110 (Fed. Cir. 2013) (emphasis original).

In any case, the Board disregarded deliberately ignored (Appx73,n.15) Margoosian’s failures including that it does not “provide any reasonable expectation that such a [sterile] solution could be successfully obtained” as well as Degala’s discussions of ongoing challenges and repeated sterilization failures. Appx1576(Tables 10,11), Appx1570(¶¶2-5); Appx3549-3550, Appx3556-3558; Appx4429; SOC(§I.C.). Indeed, BD’s efforts documented *in 2019* involving “6 years” and “Millions of dollars” to “overc[o]me the impossible” (Appx3066-3068; Appx3571) further demonstrate undue experimentation. *Impax Labs. v. Aventis Pharm.*, 545 F.3d 1312, 1315 (Fed. Cir. 2008).

The record establishes that a POSA could not have arrived at the claimed inventions based on PAR. The Board’s legal conclusion of enablement should be reversed. *Forest Labs., Inc. v. Ivax Pharm., Inc.*, 501 F.3d 1263, 1268 (Fed. Cir. 2007); *Raytheon Techs. Corp. v. Gen. Elec. Co.*, 993 F.3d 1374, 1382 (Fed. Cir. 2021) (prior art was not “enabling” where “Raytheon presented extensive, un rebutted evidence of non-enablement”).

**V. THE BOARD’S OBVIOUSNESS DETERMINATION FOR GROUND II (PAR ALONE) SHOULD BE REVERSED**

In Ground II, BD alleged obviousness based on the PAR alone. Appx6068. The Board’s Decisions, which disregarded BD’s *petitioned* arguments and were instead based on its *own* newly-manufactured obviousness combinations of PAR with prior art (e.g., Scholz and Degala), should be reversed as a matter of law and are otherwise not supported by substantial evidence.

**A. The Board’s Determination Was Predicated On Erroneous Conclusions In Ground I**

The Board’s legal determination of obviousness—predicated on its misinterpretation of PAR (Appx71)—should be reversed. Argument(§IV.).

**B. The Board’s Legal Conclusion Of Obviousness On The Independent Claims Should Be Reversed**

**1. The Board Erred In Ignoring BD’S *Petitioned* Allegations**

The Board should have found non-obviousness based on BD’s *petitioned* grounds of PAR *alone*. BD’s *petitioned* argument for the independent claims amounted to *two sentences*: it was “obvious to a POSA that a product described as ‘sterile’ in a regulatory document such as a PAR must have each component subjected to validated sterility processing..., given the relevant requirements in the relevant UK standards....If any component...had not..., the entire product or solution could not be described as ‘sterile.’” Appx6069. BD cited *no* prior art and

*never suggested* modifying PAR, instead advancing another form of inherency couched as obviousness. *Id.*

But missing limitations (here, the entire concept of *sterilized* products, articles, and compositions) cannot be established with “conclusory assertion[s]...about general knowledge in the art *without evidence on the record*, particularly where it is an important structural limitation that is not evidently and indisputably within the common knowledge of those skilled in the art.” *Himpp*, 751 F.3d at 1365-66 (emphasis original); *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1362 (Fed. Cir. 2016) (“evidentiary support” is required “especially when dealing with a limitation missing from the prior art”). BD presented no evidence *in Ground II* that *any art* disclosed a “sterilized” chlorhexidine product, article, composition, or colorant, i.e., one that had been “subjected to a suitable sterilization process such that sterility can be validated.” Appx12. And BD’s single-sentence reference to “regulatory standards” was not adequate to carry BD’s burden particularly given the known difficulties surrounding chlorhexidine products. Appx3540-3546.

The Board never addressed BD’s *petitioned* theory in its discussion of Ground II, instead opting to improperly create new grounds based on prior art combinations. While the Board asserted the record was “not limited to ‘general knowledge,’” it cited nothing from *Ground II* for such “teachings.” Appx75. As Dr. Rutala explained, the “standards” identified in Ground II never mention sterilizing

chlorhexidine products, articles, compositions, or colorants *at all*, much less to the extent necessary to satisfy the independent claims. Appx1951-1962; Appx3529-3530, Appx3540-3543.

This failure of proof is particularly problematic where *no reference* taught a “sterilized chlorhexidine product[article].” Appx3550-3551. The only “evidence” was the Board’s surprise theory that product sterilization could be accomplished using “ethylene oxide.” Argument(§§VI.A.1.&VI.B.1.); Appx3543, Appx3546-3552. This omission is significant given it was the *combination* of a sterilized product/article *with* a sterilized CHG composition that was a point of novelty. Appx1143; Appx1279.

The Board also ignored that the only evidence of record showed that the premise underlying BD’s petitioned argument (that “[i]f any component...had not been subjected to such a process, the entire product or solution could not be described as ‘sterile’” in a regulatory document) was false. Curiously, the Board



concluded that “we do not agree that a [POSA] would have understood that CareFusion...could describe an antiseptic solution as ‘sterile’ in a regulatory document when it was not, in fact, sterile.” Appx44. But Sage produced *unrefuted* evidence that ChloroPrep (US) was *mislabeled* “sterile” though the “entire product or solution” was “not sterile.” Appx5332; SOC(§I.B.); Argument(§IV.A.3.). Indeed, BD’s 2015 FAQ stated, despite its prior labeling, “the solution inside of the applicators is not treated with a separate sterilization process and, therefore, is not sterile.” Appx3050. And FDA required manufacturers to change their “sterile” labels precisely because mislabeling led to public confusion. SOC(§I.B.).

Thus, the record evidence establishes that BD’s *petitioned* ground is inadequate, and the Board’s finding of obviousness should be reversed.

## **2. The Board Exceeded Its Authority By Finding Obviousness Based On New Art Combinations And “Knowledge”**

Instead of addressing BD’s two-sentence obviousness argument based on “regulatory standards,” the Board again improperly invented *wholly new obviousness combinations* never presented in the Petition.

Specifically, the Board newly theorized “it would have been obvious...to sterilize the things labeled ‘sterile’ in the ChloroPrep PAR.” Appx72 (referencing BD’s arguments *on the SAL Claims* (Appx6069) and not independent claims). The Board provided no motivation for why a POSA would sterilize “sterile” “things”

(particularly after finding them “sterilized” in Ground I) nor did any POSA given it was an entirely new unpatentability theory revealed in the Board’s Decisions. *Id.*

Worse, in direct contravention of well-established precedent, the Board relied on new combinations of prior art *never mentioned in Ground II* as allegedly supporting its theory. The Board asserted “it was within the knowledge of [a POSA]...to sterilize the [CHG] composition individually in the ChloroPrep product using techniques such as that disclosed by ***Degala***” and ***Scholz***. Appx72-73. The Board even cited ***Chiang***—a reference not provided with the Petition. Appx74; Appx6014-6016. And having *no prior art* that described sterilization of any “chlorhexidine product/article” the Board again simply concluded that a POSA “would have known how to terminally sterilize the product disclosed in the ChloroPrep PAR and would have considered it routine to do so.” Appx73 (relying on the new theory refuted in Section IV.A.1&VI.B.1.).

The Board wrongly exceeded its authority and violated the APA in inventing new grounds of obviousness. Argument(§II.). The Board openly acknowledged that it relied on “references [that] are not argued explicitly in the Petition as part of Petitioner’s first obviousness challenge” (Appx76), but found it could because a POSA “is presumed to know the relevant prior art” (Appx77). Contrary to the Board’s *post hoc* rationalizations, the Board’s “authority is not so broad that it allows the PTO to raise, address, and decide unpatentability theories never presented....”

*Magnum*, 829 F.3d at 1381. And it is certainly well-established that the Board cannot rely on new art combinations never presented in the Petition. *Koninklijke*, 948 F.3d at 1335 (Board erred in instituting on art combinations not in petition); *EmeraChem*, 859 F.3d at 1352 (Board erred in relying on prior art unasserted for a limitation though art was raised in a different context); *Oren*, 2021 WL 3120819, at \*4 (“the Board erred when it relied on a prior art reference that was unasserted for meeting a particular limitation...”); *M&K*, 985 F.3d at 1385 (Board improperly relied on art for anticipation and not petitioned ground of obviousness). The Board’s Ground II determinations should be reversed.

### **3. The Board’s Legal Conclusion Of Obviousness Based On New Combinations Were Flawed**

The Board’s new combinations were nevertheless flawed as a matter of law. The claims are directed to *sterilized products and articles* comprising a *sterilized CHG composition* and other components. The prosecution history established that “the prior art does not teach a product which is necessarily *itself* sterilized and comprising sterilized [CHG] as *further recited* in the claims.” Appx1143. Yet, that combination is exactly what is still missing from any referenced art and cannot simply be invented based on the Board’s knowledge. Appx3546-3550; *Arendi*, 832 F.3d at 1363.

As Dr. Rutala explained, the invention was not obvious. Appx3546-3552. There was no *evidence* of sterilized chlorhexidine products or articles (much less



ones comprising sterilized CHG solutions). Appx3550-3551. The field of chlorhexidine sterilization was “nascent,” “fraught with failure and significant uncertainty existed over whether attempts to sterilize...were successful or could be validated.” Appx3547-3550. Indeed, BD documented Margoosian’s and Degala’s failures to consistently sterilize CHG solutions. Argument(§VI.); SOC(§I.C.). While the Board disagreed that CHG “sterilization was a nascent field,” it deliberately declined to address unrebutted evidence establishing it. Appx73,n.15.

In a different matter, BD argued that, despite purporting to describe CHG sterilization, “nowhere does Margoosian provide any reasonable expectation that such a [sterile] solution could be successfully obtained.” Appx4429. Ignoring that evidence, the Board erroneously concluded that there would have been “a reasonable expectation of success” because POSAs “would have known of the existence of a product containing sterilized [CHG]...and....terminally sterilized CHG products.” Appx74. But supposed knowledge of “*the existence* of a product” does not rebut evidence demonstrating success would not be reasonably expected. SOC(§§I.A.&C.); *Raytheon*, 993 F.3d at 1380-82; *OSI Pharm. v. Apotex Inc.*, 939 F.3d 1375, 1385 (Fed. Cir. 2019).

### **C. The Board Failed To Address The Non-Obviousness Of The SAL Claims**

Regarding the SAL Claims, the Board wrongly concluded that the claims were obvious in view of “regulatory standards.” Appx74-75.

As discussed, the “standards” did not establish any “required SAL range” for sterilized chlorhexidine products/articles—they did not mention chlorhexidine at all. Argument(§IV.A.5); Appx3540-3546, Appx3529-3532.

Moreover, the Board never addressed why success would be reasonably expected. While BD presented reasons why POSAs *desired* the recited SAL, there was no evidence as to *how* to achieve it for chlorhexidine *products/articles* comprising sterilized CHG compositions. Appx6070-6072; Appx3543(¶333), Appx3546-3552. There is a “clear distinction...between a patent challenger’s burden to prove that a [POSA] would have been *motivated* to combine prior art references and the *additional* requirement that the patent challenger also prove that the [POSA] would have had a reasonable expectation of successfully achieving the claimed invention.....” *Eli Lilly and Co. v. Teva Pharms. Int’l GmbH*, 8 F.4th 1331, 1344 (Fed. Cir. 2021); *OSI*, 939 F.3d at 1385. Here, there was no evidence of *how* to sterilize *any product/article*—much less an explanation of how one would successfully expect to do so *to the claimed SAL*. Appx3545-3546(¶¶342-344).

The Board’s obviousness determination should be reversed as it is based on “conclusory assertion[s]...about general knowledge in the art *without evidence on the record...*” on “an important structural limitation that is not evidently and indisputably within the common knowledge....” *Himpp*, 751 F.3d at 1365-66 (emphasis original).

## **VI. THE BOARD’S DETERMINATION OF OBVIOUSNESS BASED ON PAR AND DEGALA (GROUND III) SHOULD BE REVERSED**

The Board’s legal conclusion of obviousness must be reversed because PAR and Degala are still missing numerous elements and the Board erred in fabricating new theories and “motivations” to modify PAR.

### **A. The Board’s Determination Was Predicated On Its Erroneous Conclusions In Ground I**

The Board’s legal determination of obviousness—predicated on its misinterpretation of PAR (Appx87)—should be reversed. Argument(§IV.).

### **B. The Board Erred In Finding The Independent Claims Obvious Based On Its Own Theories**

#### **1. Neither PAR Nor Degala Teach A Sterilized *Product/Article*, And The Board Cannot Invent The Element Based On Never-Argued POSA “Knowledge”**

The claims recite *sterilized chlorhexidine products* and *articles* that can contain, apply, and deliver a sterilized CHG composition—elements that neither PAR nor Degala disclose. Appx3549-3554(¶¶353,361-363). For this reason alone, the legal conclusion of obviousness must be reversed.

BD never asserted that PAR or Degala teach a “sterilized...*article/product*.” BD argued Degala discussed sterilizing only one component—the CHG composition. Appx6073; Appx3553-3554(¶363). And, while BD argued, that PAR discloses “both a sterile CHG solution *and* a sterile applicator” (Appx90,

Appx6044), these are *components* of the claimed “sterilized product”/“article”—not the “product/article” itself. Appx228; Argument(§IV.A.1); Appx3557.

The prosecution history makes clear that sterilization of *components* of the product or article (e.g., composition or applicator) does not render the entire *product/article* sterile:

...[A]n individually sterilized component in an article/product does not impart sterility onto the entire article/product. Instead, as provided...throughout the specification as filed, the sterility assurance level of an article/product results from ***the article/product as a whole being subjected to a sterilization process.***

Appx3273 (parent). Indeed, in allowing the claims ***over Degala*** (Appx209), the PTO explained that “the prior art does not teach a product which is necessarily itself sterilized ***and*** comprising sterilized [CHG] as further recited in the claims.” Appx1143.

Once Sage established that PAR and Degala disclose ***no*** “sterilized...product”/“article,” the Board invented a new obviousness theory found nowhere in the record. The Board newly contended that “terminal sterilization techniques and their use on packaging of products containing [CHG] compositions were well-known and routine as of 2015,” this time conjecturing that it was “***obvious...to terminally sterilize the product*** described in the ChloroPrep PAR if it had not already been subject to such a process.” Appx90.

**First**, the new theory should be rejected because the Board exceeded its authority and violated the APA in raising wholly new obviousness theories not discussed anywhere in the record. Argument(§II.); *Magnum*, 829 F.3d at 1381.

**Second**, the new theory is unsupported by the record. The Board cited *no* prior art evidencing this purported “knowledge” (particularly as it relates to “products containing [CHG] compositions”). Instead, the Board cited either *generic discussions* of terminal sterilization in medical device processing (not chlorhexidine products/articles) or teachings from *the patents-in-suit*. Appx90, citing Appx1347(¶71) (Dabbah quoting patents-in-suit); Appx2398-2399, Appx2430-2432, Appx2443 (Rutala discussing patents-in-suit and general discussions of “terminal sterilization” during district court claim construction); Appx1951-1962 (BS-EN556-1, no mention of chlorhexidine).

The Board also cited BD’s 2015 FAQ though the paper does not reference “terminal sterilization” but does state the solution “is not treated with a separate sterilization process and, therefore, is *not sterile*.” Appx90, citing Appx3050-3051. Indeed, the Board unilaterally concluded that “the ChloroPrep USA product was subject to terminal sterilization in 2015” (Appx90), but BD’s own 2015 internal document said it was not. Appx2545(“You may have heard of label changes for ChloroPrep®...in the USA....These currently do not require terminal sterilization....”).

The Board cannot simply invent claim elements and deem them “obvious” and “routine” without “*evidence on the record*, particularly where it is an important structural limitation...” *Himpp*, 751 F.3d at 1365-66; *Arendi*, 832 F.3d at 1366 (Board’s “errors were particularly problematic considering...a key limitation of the...patent[s] was missing from the prior art reference”).

**Third**, the Board’s new theories are demonstrably wrong. Evidence of record established that “terminal sterilization” of chlorhexidine products were fraught with difficulties and were far from “routine” as the Board surprisingly concluded. *See, e.g.*, Appx3022, Appx3026-3031 (“typical terminal sterilization methods...could cause degradation of the active ingredient...[CHG]”); Appx3065 (BD: “Conventional terminal sterilization processes...are not compatible with...CHG and can damage the chemical integrity of the active ingredient”); Appx3330(¶¶9-10) (identifying ways to avoid sterilization with ethylene oxide).

Neither PAR nor Degala disclose a “sterilized chlorhexidine product[article]” and thus cannot render obvious the claimed invention. Thus, the Board’s Decisions including its unsupported new theories should be reversed. *Univ. of Strathclyde v. Clear-Vu Lighting LLC*, 17 F.4th 155, 162 (Fed. Cir. 2021).

## **2. The Board Wrongly Concluded That Degala Teaches A “Sterilized” CHG Composition As Construed**

The Board construed “sterilized” to mean “has been subjected to a suitable sterilization process such that sterility can be **validated**.” Appx12. But the Board

wrongly concluded that Degala taught a “sterilized” CHG composition though there was no evidence that Degala taught *any* CHG composition had been subjected to a *validated* process nor did BD’s Petition claim it did. Appx89-90; Appx3557-3558(¶¶370-72); Appx6073-6075.

The Board found that Degala taught a “validated” sterilization process—not based on argument in the Petition or any teaching of validation *in Degala*—but rather because Dr. Rutala purportedly “conceded” that “you have to have a validated sterility process to have a [SAL].” Appx90. In support of the “admission,” the Board cited Rutala’s deposition from the district court *discussing the patents-in-suit* during claim construction—not *Degala. Id.*, citing Appx2513; Appx2504, Appx2507-2514.

The Board exceeded its authority by not addressing BD’s *petitioned* arguments and again inventing new ones. Argument(§II). *In its Petition*, BD argued that the solutions in Degala were subjected to a 7-day sterility test (Appx6074-6075, citing Appx1573(¶40)), but that had nothing to do with whether the sterilization process was *validated* as Dr. Rutala explained (Appx3468(¶102), Appx3558(¶371)).

Moreover, the Board’s new theory about how to prove “validation” was unsupported. The disclosure of an SAL in Degala does not mean that Degala inherently disclosed a “validated” sterilization process to achieve that SAL. To the contrary, Dr. Rutala emphasized that SAL and validation are distinct: “you...determine a [SAL]. And then...do validation to ensure that your sterilization

process...provides a consistent and repeatable sterile product.” Appx2447(205:7-16, 206:14-21). Degala did not teach a *validated* sterilization process, e.g., one that ensured that CHG compositions produced according to its method would be found consistently and reliably sterile. Appx3468(¶102), Appx3558(¶371), Appx2477(326:16-19). To the contrary, both Degala’s and Margoosian’s repeated failures in achieving sterile CHG compositions only months before the patents-at-issue were filed demonstrated the results were inconsistent and unreliable. Appx1576(Table 11); SOC(§I.C.).

### **3. The Board Exceeded Its Authority In Presenting Its Own “Motivations” To Modify PAR And Failed To Address Reasonable Expectation Of Success**

*BD’s Petition never argued that a POSA would be motivated to modify PAR* in view of Degala; rather, BD insisted that Degala showed that *PAR* was “sterilized” and that the references were “in the same field” and address the “same problems”. Appx6075, Appx6079. Instead of addressing BD’s *petitioned* motivations, the Board theorized a POSA “would have readily applied Degala’s technique” to *PAR* because “Degala teaches an improvement upon the method used previously in the industry.” Appx92. The Board again hypothesized that a “[POSA] would have had reason to sterilize the things identified as ‘sterile’...” Appx93-94.

The Board again erred in advancing its new arguments on behalf of BD and then ruling on them. *IPR Licensing*, 942 F.3d at 1369-70; *S.-Tek Sys., LLC v.*



*Engineered Corrosion Sols., LLC*, 748 F.App’x 1003, 1007 (Fed. Cir. 2018) (petitioner waived motivation theory). The Board should have rejected BD’s *petitioned* motivation arguments as they failed to establish obviousness. *Rembrandt Wireless Techs., LP v. Samsung Elecs. Co.*, 853 F.3d 1370, 1380-81 (Fed. Cir. 2017); *Comcast Cable Commc’ns, LLC v. Promptu Sys. Corp.*, 838 F.App’x 555, 557 (Fed. Cir. 2021) (“motivation to combine” not proven because it merely...alleged the references came from the same field of study and address the same problem...”).

***Regarding the expectation of success***, Sage contended that successfully developing a sterilized CHG product/article as claimed was unlikely given the challenges facing POSAs and failures of others. Appx6389-6390, citing, *e.g.*, Appx3571, Appx3549-3551. Indeed, there was no evidence of any sterilized CHG products/articles comprising sterilized CHG compositions, and Dr. Rutala’s testimony that the art was “nascent” remained unrebutted. Appx3571(¶412); SOC(§§I.A.&I.C.).

The Board nonetheless summarily found a POSA “would have had a reasonable expectation of success,” offering no basis for its statement. Appx94. The Board *expressly declined to consider* BD’s *own statements* regarding the nascent state of the art even though a *different* Board found success was unlikely because “[CHG] is a relatively unstable compound that degrades with just the application of heat” at BD’s urging. *Degala*, 2021 WL 165153, at \*6. In that other matter, BD

repeatedly complained about the “expected degradation” and unpredictability of chlorhexidine products, Margoosian’s failure to *actually* sterilize products, and the lack of “any reasonable expectation that such a [sterile] solution could be successfully obtained.” Appx73,n.15; Appx4427-4430; SOC(§I.C.). Because the Board ignored the critical issues, its obviousness determination should be vacated. *In re Universal Elecs., Inc.*, No. 2022-1230, 2023 WL 3335536, at \*3-4 (Fed. Cir. May 10, 2023) (Board has not “‘done its job’ when it avoids an applicant’s primary argument”); *VirnetX Inc. v. Cisco Sys., Inc.*, 776 F.App’x 698, 702 (Fed. Cir. 2019) (“Board failed to meaningfully address [patentee’s] argument”); *Provisur Techs., Inc. v. Weber, Inc.*, 50 F.4th 117, 123-24 (Fed. Cir. 2022) (same).

**C. The Board Erred In Ignoring BD’s Ground III Theories For The Colorant And SAL Claims**

In Ground III, BD argued that the *Colorant Claims* were obvious based on a statement in Degala that its sterilization methods can be applied to “medicaments, chemical compositions, cleansing agents, cosmetics, or the like,” contending that it could be applied to “colorants.” Appx6077-6078, citing Appx1571(¶27). Sage explained that this statement never mentioned colorants (*id.*), and BD cited no evidence that “it was known to sterilize any...colorant in a CHG composition.” Appx6385, citing Appx3565-3567. Sage explained why sterilizing colorants presented “stability challenges” because “CHG...compositions are often not stable with dye components.” Appx3330(¶13), Appx3566-3567.

BD argued that the *SAL Claims* were obvious because certain Degala *solutions* achieved SALs within the claimed range. Appx6076, citing Appx1573(¶41), Appx1576-1577(¶52). Sage explained, however, that the claims recite the *product/article* have the recited SAL—not the *solution*. Appx6386; Appx228; Appx3560-3561. And the patents confirm that the SAL of a product/article is not the same as the SAL of a solution. *Id.*; Appx222(16:58-65).

Rather than rule on the petitioned *Ground III* arguments regarding *Degala*, the Board instead reiterated its *Ground I* opinion that PAR disclosed the elements. Appx94-95. Those opinions were wrong as discussed in Sections IV.B.-C. But, again, the Board erred in not addressing the *petitioned* grounds. Argument(§II.); *Universal*, 2023 WL 3335536, at \*3-4. There is no obviousness of the Colorant or SAL Claims based on the *petitioned* combinations. *Arendi*, 832 F.3d at 1362; *Strathclyde*, 17 F.4th at 162.

## **VII. THE BOARD FAILED TO ADEQUATELY ADDRESS OBJECTIVE INDICIA OF NON-OBVIOUSNESS**

“Objective indicia of nonobviousness must be considered in every case where present.” *Apple Inc. v. Samsung Elecs. Co., Ltd.*, 839 F.3d 1034, 1048 (Fed. Cir. 2016). Here, Sage provided substantial evidence of objective indicia of non-obviousness linked to the invention including:

- *Long-felt, unmet need* for sterilized chlorhexidine products to avoid outbreaks from contaminated antiseptics. SOC(§§I.A.-C.); Appx3573-3579.

- **Industry skepticism** including evidence that achieving such a product was “impossible or impractical,” “[t]he technical challenges...are numerous,” and there were “challenges” caused by “minimizing potential byproducts that may be produced.” SOC(§§I.A.&III.); Appx3579-3581(¶¶435-440).
- **Failure of others**—including Margoosian and Degala. Argument(§VI.B.); SOC(§I.C.); Appx3581-3583(¶¶441-47).
- **Praise and commercial success** including BD’s own 2019 statements about the success of its “new” fully-sterilized ChloroPrep products, which “overcame the impossible” after “years” of effort. SOC(§III.); Appx3583-3585; Appx3065-3068; Appx4010-4011; Appx4300-4304, Appx4309; Appx4038-4040.

The Board ***found a nexus*** between the inventions and the evidence (Appx79), but failed to appropriately credit it. The Board contended that *Degala* “demonstrates sterilization of a [CHG] composition was known,” stating there was no evidence presented in the four months between Degala’s publication and the patents’ filing (ignoring BD’s 2019 statements). Appx80, Appx82, Appx85. The Board’s analysis was wrong as a matter of law as it eviscerated the purpose of objective indicia, thus requiring reversal. Instead of assessing the *objective* evidence to “guard against the statutorily proscribed hindsight reasoning” in analyzing the art, the Board used the art *as a sword* to gut the very evidence that was supposed to corral its analysis.

*WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1328-30 (Fed. Cir. 2016); *Lindemann Maschinenfabrik GMBH v. Am. Hoist & Derrick Co.*, 730 F.2d 1452, 1461 (Fed. Cir. 1984) (“All evidence must be considered *before* a conclusion is reached).

### CONCLUSION

This Court should reverse and/or vacate the Board’s judgment finding the claims unpatentable.

Respectfully submitted,

Dated: August 22, 2023

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# **ADDENDUM**

**ADDENDUM**

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U.S. Patent No. 10,398,642	Appx208-228
U.S. Patent No. 10,688,067	Appx229-249

Trials@uspto.gov  
571-272-7822

Paper 41  
Date: January 9, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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BECTON DICKINSON AND COMPANY,  
Petitioner,

v.

SAGE PRODUCTS, LLC,  
Patent Owner.

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IPR2021-01201  
Patent 10,398,642 B1

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Before JAMES A. TARTAL, GEORGIANNA W. BRADEN, and  
DAVID COTTA, *Administrative Patent Judges*.

COTTA, *Administrative Patent Judge*.

JUDGMENT

Final Written Decision

Determining All Challenged Claims Unpatentable

*35 U.S.C. § 318(a)*

Granting Patent Owner's Motion for Entry of Protective Order and to Seal  
*37 C.F.R. §§ 42.14, 42.54*



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We have jurisdiction to hear this *inter partes* review under 35 U.S.C. § 6, and this Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). For the reasons that follow, we determine Becton Dickinson and Company (“Petitioner”) has shown by a preponderance of the evidence that claims 1–3, 5–8, 10–18, and 20 of U.S. Patent No. 10,398,642 B1 (Ex. 1001, “the ’642 patent”) are unpatentable.

## I. INTRODUCTION AND BACKGROUND

### A. *Procedural History*

Petitioner filed a Petition requesting an *inter partes* review of claims 1–3, 5–8, 10–18 and 20 (the “challenged claims”) of the ’642 patent. Paper 2 (“Pet.”). Sage Products, LLC (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). Pursuant to 35 U.S.C. § 314(a), we instituted an *inter partes* review of all challenged claims on all proposed grounds of unpatentability. See Paper 7 (“Dec. to Inst.”), 46.

After institution of trial, Patent Owner filed a Patent Owner Response (Paper 23, “PO Resp.”), to which Petitioner filed a Reply (Paper 28, “Pet. Reply”). Patent Owner then filed a Sur-Reply (Paper 35, “PO Sur-Reply”).

An oral argument was held on October 13, 2022. A transcript of the oral argument is included in the record. Paper 40 (“Tr.”).

### B. *Real Parties in Interest*

Petitioner states “[t]he real party-in-interest for Petitioner is Becton, Dickinson and Company.” Pet. 3. Patent Owner states that “Sage is a wholly-owned subsidiary of Stryker Corporation.” Paper 4 (Patent Owner’s Mandatory Notice), 2. The parties do not raise any issue or provide arguments regarding real parties in interest in this proceeding.

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*C. Related Proceedings*

The parties identify the following district court case involving the '642 patent: *Sage Products, LLC v. Becton, Dickinson and Company*, Case No. 2:20-cv-08000-KMJBC (D. N.J. filed June 30, 2020). Pet. 4; Paper 4, 2. The parties also identify IPR2021-01202 asserted against U.S. Patent No. 10,688,067, which is related to the '642 patent. Pet. 4; Paper 4, 2.

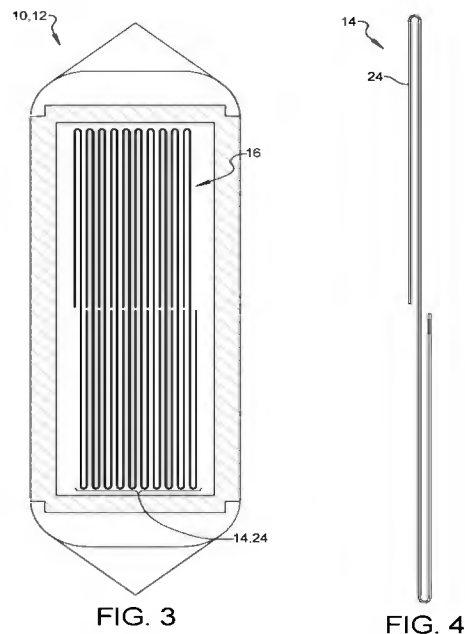
*D. The '642 Patent (Ex. 1001)*

The '642 patent is titled “Sterilized Chlorhexidine Article and Method of Sterilizing a Chlorhexidine Article,” and issued on September 3, 2019. Ex. 1001, codes (45), (54). It is a continuation of U.S. Patent Application No. 15/360,037, which issued as U.S. Patent No. 10,188,598, and relies on a provisional application filed on Nov. 25, 2015. *Id.* at codes (60), (63).

*1. Written Description*

The '642 patent relates to a sterilized chlorhexidine gluconate (“CHG”) product that includes (1) a sterilized composition of chlorhexidine gluconate and alcohol, (2) an applicator, and (3) a receptacle to impregnate the applicator with the sterilized chlorhexidine gluconate composition when the receptacle is compromised. *Id.* at code (57). One embodiment of the invention is shown in Figures 3 and 4, reproduced below:

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As shown above in Figures 3 and 4, sterilized chlorhexidine product 10 comprises package 12 and chlorhexidine article 14. Ex. 1001, 2:35–37. Package 12 defines interior volume 16, and chlorhexidine article 14 is removably disposed in interior volume 16 of package 12. *Id.* at 2:37–39. The '642 patent discloses that package 12 is particularly suitable for terminal sterilization processes. *Id.* at 2:53–55. The '642 patent explains that “when the chlorhexidine product 10 is subjected to a sterilization process, such as a terminal sterilization process, it will be appreciated that the package 12 is also subjected to the sterilization process in addition to the chlorhexidine article 14 disposed therein.” *Id.* at 16:66–17:3.

In certain embodiments, the sterilized chlorhexidine article is intended to be used by a patient care provider for disinfecting skin or mucous membranes of a patient. *Id.* at 3:64:4:2. As shown above in Figure 4, chlorhexidine article 14 comprises applicator 24 and an antiseptic composition. *Id.* at 4:5–6. Applicator 24 facilitates topical application of the antiseptic composition to the skin or mucous membranes of a patient. *Id.*

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at 4:6–9. The '642 patent discloses that “[t]he antiseptic composition comprises one or more antibacterial agents and one or more solvents.” *Id.* at 7:23–24.

The '642 patent provides ranges for each of the components of the antiseptic compositions explaining that such ranges “may refer to the amounts of those components in the sterilized antiseptic compositions or the unsterilized anti-septic compositions.” *Id.* at 14:38–42. The '642 patent discloses that “[b]ecause certain sterilization processes may cause certain components to degrade, the amount of each component in the antiseptic composition may vary from the non-sterile condition to the sterilized condition.” *Id.* at 14:42–45; *see also id.* at 17:14–18 (“When the chlorhexidine article is sterilized, the sterilized antiseptic composition may further comprise degradation impurities. The degradation impurities may be a result of exposing the chlorhexidine article to the sterilization process.”).

The '642 patent states:

It should be appreciated that the present disclosure describes a method of sterilizing a chlorhexidine product to form a sterilized chlorhexidine article. As such, throughout this disclosure, description that accompanies the terms the chlorhexidine article, or components and compositions thereof, may be referred to as the ‘sterilized’ component or composition upon being exposed to suitable processing where such sterility can be validated. By way of nonlimiting example, the sterility of the chlorhexidine article may be validated in accordance with ISO 11137.

*Id.* at 3:54–63. The '642 patent provides examples of sterilization processes that may be “suitable to sterilize the chlorhexidine article 14 such that the sterility of the chlorhexidine article 14 can be validated.” *Id.* at 16:14–17. Such examples include “heat sterilization, radiation sterilization, ethylene

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oxide gas sterilization, or combinations thereof.” *Id.* at 16:17–20. In one embodiment, “[c]ooling the chlorhexidine product 10 may comprise cooling the chlorhexidine product 10 to a temperature of from -100° C. to 20° C.” *Id.* at 19:25–27.

The ’642 patent then discloses that

The method further comprises sterilizing the chlorhexidine product 10 to form the sterilized chlorhexidine article 14. The chlorhexidine product 10 may be sterilized by any sterilization process such that the sterility of the chlorhexidine article 14 can be verified. In some embodiments, sterilizing the chlorhexidine product 10 comprises irradiating the chlorhexidine product 10 to form a sterilized chlorhexidine article 14.

*Id.* at 20:66–21:11. The ’642 patent explains that in certain other embodiments, “sterilizing the chlorhexidine product 10 further comprises heat sterilizing the chlorhexidine product 10.” *Id.* at 21:7–9. The ’642 patent then provides a reminder that “[o]f course it should be appreciated that the antibacterial agent of the antiseptic composition may not be compatible with heat sterilization.” *Id.* at 21:9–11.

In addition to cooling, freezing, and heat sterilization, the ’642 patent discloses irradiating “the chlorhexidine product 10 to form the sterilized chlorhexidine article 14.” *Id.* at 21:34–36. The ’642 patent states that the radiation type can include “gamma radiation, electron- beam radiation, x-ray radiation, or combinations thereof” or “electron beam radiation.” *Id.* at 21:37–41. The ’642 patent further discloses that “[t]he chlorhexidine product 10 may be irradiated with the radiation type by any suitable radiation unit.” *Id.* at 21:43–44.

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## 2. *Illustrative Claims*

The '642 patent includes twenty claims. Claims 1–3, 5–8, 10–18, and 20 are challenged here. Pet. 6. Claims 1 and 12 are the only independent claims. Claim 1 is illustrative of the claims challenged in this Petition and reads as follows:

1. A sterilized chlorhexidine product for topical disinfection, said sterilized chlorhexidine product comprising:
  - a sterilized chlorhexidine gluconate composition;
  - an applicator for facilitating application of the sterilized chlorhexidine composition; and
  - a receptacle containing the sterilized chlorhexidine gluconate composition to provide the sterilized chlorhexidine gluconate composition to impregnate the applicator when the receptacle is compromised;wherein the sterilized chlorhexidine gluconate composition comprises chlorhexidine gluconate and alcohol.

Ex. 1001, 27:25–35.

## *E. Asserted Challenges to Patentability and Evidence of Record*

Petitioner challenges the patentability of claims 1–3, 5–8, 10–18 and 20 of the '642 patent based on the following references or combination of references:

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Claims Challenged	35 U.S.C. §	Reference(s)/Basis
1–3, 5–8, 10–18, and 20	102(a)	ChloraPrep PAR <sup>1</sup>
1–3, 5–8, 10–18, and 20	103 <sup>2</sup>	ChloraPrep PAR
1–3, 5–8, 10–18, and 20	103	ChloraPrep PAR, Degala <sup>3</sup>

Patent Owner does not dispute that each reference qualifies as prior art. *See, e.g.*, PO Resp. 20–57.

In support of its patentability challenge, Petitioner relies on, *inter alia*, the following declarations: (1) Roger Dabbah, Ph.D. (“Dr. Dabbah”) (Ex. 1003); (2) Simon Noble-Clarke (Ex. 1037); (3) Christopher McGinley (Ex. 1038); and (4) Sean Sheridan, Ph.D. (“Dr. Sheridan”) (Ex. 1039). Additionally, Petitioner submits the testimony of William Rutala, Ph.D. adduced in the parallel district court proceeding. *See* Exs. 1040, 1042, 1043.

To support its positions, Patent Owner relies on the Declaration of William Rutala, Ph.D. (“Dr. Rutala”) (Exhibit 2023).

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<sup>1</sup> Medicines and Healthcare products Regulatory Agency, Public Assessment Report, “ChloraPrep with Tint 2% w/v/70%v/v Cutaneous Solution,” archived on November 17, 2010, *available at* <https://webarchive.nationalarchives.gov.uk/ukgwa/20101117020428/http://www.mhra.gov.uk/home/groups/par/documents/websiteresources/con071263.pdf> (“ChloraPrep PAR,” Ex. 1005).

<sup>2</sup> The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), included revisions to 35 U.S.C. § 103 that became effective as of March 16, 2013. The application for the ’642 patent was filed after March 16, 2013, and includes a priority claim to an application filed after this date. Ex. 1001, codes (22), (63). Accordingly, we apply the post-AIA version of 35 U.S.C. § 103.

<sup>3</sup> Degala et al., US 2015/0190535 A1, published Jul. 9, 2015 (“Degala,” Ex. 1007).

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## II. PRELIMINARY MATTERS

### Claim Construction

A claim “shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b).” 37 C.F.R. § 42.100(b) (2020). Under that standard, “[c]laim terms are given their ordinary and customary meaning, which is the meaning the term would have to a person of ordinary skill in the art at the time of the invention.” *Power Integrations, Inc. v. Fairchild Semiconductor Int’l, Inc.*, 904 F.3d 965, 971 (Fed. Cir. 2018) (citing *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc)). The meaning of claim terms may be determined by “look[ing] principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

The ordinary and customary meaning of a claim term applies “unless the patentee demonstrated an intent to deviate from [it] . . . by redefining the term or by characterizing the invention in the intrinsic record using words or expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope.” *Teleflex, Inc. v. Ficosa N. America Corp.*, 299 F.3d 1313, 1327 (Fed. Cir. 2002); *see also Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1371 (Fed. Cir. 2014). Additionally, although we “look to the specification and prosecution history to interpret what a patentee meant by a word or phrase in a claim,” we do not read “extraneous limitations . . . into the claims from the specification or prosecution history”



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absent an express definition or clear disavowal of claim scope. *Bayer AG v. Biovail Corp.*, 279 F.3d 1340, 1348 (Fed. Cir. 2002).

In the Petition, Petitioner asserted that all claim terms should receive their “plain and ordinary meaning” and that an express construction of the challenged claims is unnecessary for resolution of this proceeding. Pet. 16.

In the Institution Decision, we construed the claim term “sterilized” to mean: “the component or composition has been subjected to a suitable sterilization process such that sterility can be validated.” Dec. to Inst. 22. Patent Owner agrees with this construction. PO Resp. 17–18 (“The Institution Decision correctly construed ‘sterilized’ . . . consistent with its ordinary meaning, the description in the patent, and the meaning to a [person of ordinary skill in the art].”); Sur-reply 3–4 (same). In its Reply, Petitioner argues that the construction in the Institution Decision “improperly imports a process limitation into apparatus claims, even though the process by which an apparatus is made is irrelevant.” Reply 3. Petitioner also contends that the “use of the word ‘suitable’ [in the Board’s preliminary construction] interjects needless ambiguity into the claims.” *Id.* Thus, Petitioner proposes that the term “sterilized” should be construed to mean “in a sterile condition.” *Id.* at 2.

We begin by considering the specification of the ’642 patent. The specification states:

It should be appreciated that the present disclosure describes a method of sterilizing a chlorhexidine product to form a sterilized chlorhexidine article. As such, throughout this disclosure, description that accompanies the terms the chlorhexidine article, or components and compositions thereof, may be referred to as the ‘sterilized’ component or composition upon being exposed to suitable processing where such sterility

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can be validated. By way of non-limiting example, the sterility of the chlorhexidine article may be validated in accordance with ISO 11137.

Ex. 1001, 3:54–63. The specification thus defines the term “sterilized” to mean that the article/component/composition described as sterilized was “exposed to suitable processing where such sterility can be validated.” *See also id.* at 16:21–25 (“In the context of this disclosure, when the chlorhexidine article 14 is sterilized, the components of the chlorhexidine article 14 are in a sterile condition, and that sterile condition has been validated, the resultant article is referred to as a sterilized chlorhexidine article 14”).

During the prosecution of the parent application to the ’642 patent, Patent Owner specifically stated that “for an article or product to have ‘a sterility assurance level’ as required by claim 1, the article/product must first be subjected to a sterilization process.” Ex. 2012, 95. Patent Owner explained:

the “sterility assurance level” of a product is unrelated to the amount of chlorhexidine gluconate (or for that matter, any antimicrobial agent) present in the product. Instead the “sterility assurance level” of a product results from a sterilization process.

*Id.* Patent Owner then distinguished the cited prior art on the basis that “[n]one of the cited references disclose, teach, or even suggest subjecting a chlorohexidine product as recited in the claims to a sterilization process.”

*Id.* Thus, the prosecution history, like the specification, associates the sterility of a product with subjecting that product to a “sterilization process.”

Petitioner argues that our preliminary construction “improperly imports a process limitation into apparatus claims.” Petitioner’s proposed

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construction thus avoids reciting a process step by proposing that “sterilized” means “in a sterile condition.” The Federal Circuit, however, has explained that “process steps can be treated as part of the product claim if the patentee has made clear that the process steps are an essential part of the claimed invention.” *Vectura Ltd. v. Glaxosmithkline LLC*, 981 F.3d 1030, 1038 (Fed. Cir. 2020) (quoting *Continental Circuits LLC v. Intel Corp.*, 915 F.3d 788, 799 (Fed. Cir. 2019)).

Here, as discussed above, the specification and prosecution history make clear that being subjected to a sterilization process is an essential part of the claimed invention. Because the case law makes clear that process steps can be part of a product claim, and because our preliminary claim construction is more closely aligned with the language used in the specification and in the prosecution history than the language proposed by Petitioner, we maintain our preliminary claim construction. Accordingly, we construe “sterilized” to mean that the article/component/ composition recited as “sterilized” has been subjected to a suitable sterilization process such that sterility can be validated.

#### *A. Principles of Law*

A claim is unpatentable under 35 U.S.C. § 102 if a prior art reference discloses every limitation of the claimed invention, either explicitly or inherently. *Glaxo Inc. v. Novopharm Ltd.*, 52 F.3d 1043, 1047 (Fed. Cir. 1995). Furthermore, the prior art reference—in order to anticipate under 35 U.S.C. § 102—must lead to a composition that falls within the scope of the claim “without *any* need for picking, choosing, and combining various disclosures not directly related to each other by the teachings of the cited reference.” *In re Arkley*, 455 F.2d 586, 587 (CCPA 1972). Thus, it is not

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enough that the prior art reference discloses multiple, distinct teachings that the artisan might somehow combine to achieve the claimed invention. *See Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1371–72 (Fed. Cir. 2008) (finding a prior art reference is anticipatory only if the reference discloses every limitation of the claimed invention arranged or combined in the same way as in the claim). “However, a reference can anticipate a claim even if it ‘d[oes] not expressly spell out’ all the limitations arranged or combined as in the claim, if a person of skill in the art, reading the reference, would ‘at once envisage’ the claimed arrangement or combination.” *Kennametal, Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376, 1381 (Fed. Cir. 2015) (quoting *In re Petering*, 301 F.2d 676, 681 (CCPA 1962)) (alteration in original). Specifically, a “reference may still anticipate if that reference teaches that the disclosed components or functionalities may be combined and one of skill in the art would be able to implement the combination.” *Blue Calypso, LLC, v. Groupon, Inc.*, 815 F.3d 1331, 1341–1344 (Fed. Cir. 2016); *see Bristol-Myers Squibb Co. v. Ben Venue Labs., Inc.*, 246 F.3d 1368, 1379 (Fed. Cir. 2001).

In order to anticipate “a prior art reference must disclose all elements . . . within the four corners of the document.” *Microsoft v. Biscotti*, 878 F.3d 1052, 1068 (Fed. Cir. 2017). Nonetheless, “[e]xtrinsic evidence ‘may be used to interpret the allegedly anticipating reference and [to] shed light on what it would have meant to a [PHOSITA].’” *Monsanto Technology LLC v. EI DuPont de Nemours and Company*, 878 F.3d 1336, 1345 (Fed. Cir. 2018) (quoting *Ciba-Geigy Corp. v. Alza Corp.*, 68 F.3d 487 (Fed. Cir. 1995)).

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A claim is unpatentable under 35 U.S.C. § 103 if “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, objective evidence of non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). When evaluating a combination of teachings, we must also “determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). Whether a combination of prior art elements would have produced a predictable result weighs in the ultimate determination of obviousness. *Id.* at 416–417.

We analyze the challenges presented in the Petition in accordance with the above-stated principles.

### *B. Burden of Proof*

In an *inter partes* review, the petitioner must show with particularity why each challenged claim is unpatentable. *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016); 37 C.F.R. § 42.104(b). The burden of persuasion never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

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*C. Level of Ordinary Skill in the Art*

Factors pertinent to determining the level of ordinary skill in the art include (1) the educational level of the inventor; (2) the type of problems encountered in the art; (3) prior-art solutions to those problems; (4) the rapidity with which innovations are made; (5) the sophistication of the technology; and (6) the educational level of workers active in the field. *Envtl. Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696–97 (Fed. Cir. 1983). Not all factors may exist in every case, and one or more of these or other factors may predominate in a particular case. *Id.* These factors are not exhaustive, but merely a guide to determining the level of ordinary skill in the art. *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007). Moreover, the prior art itself may reflect an appropriate skill level. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

Petitioner contends that a person of ordinary skill in the art at the critical time would have possessed “at least an undergraduate degree in the pharmaceutical sciences, pharmacy, biochemistry, microbiology, or a related field, and a Masters in a similar field and at least 6 years industry experience or a Ph.D. in a similar field and at least 4 years industry experience in the field developing sterilization processes, sterile medical devices and/or formulations or tests for evaluating sterility.” Pet. 15.

Patent Owner does not expressly offer its own definition of a person of ordinary skill in the art, but agrees with the definition we provided in our Institution Decision. Ex. 2023 ¶¶ 141–143 (Dr. Rutala agreeing with the definition provided in our Institution Decision); PO Resp. 15 (citing Dr. Rutala’s testimony). The Institution Decision defined the person of ordinary skill as follows:

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[A] person of ordinary skill in the art at the time of the invention would have possessed at least an undergraduate degree in the pharmaceutical sciences, pharmacy, biochemistry, microbiology, or a related field, with experience with sterilization processes for medical products and their components, as well as familiarity with antiseptics such as chlorhexidine.

Inst. Dec. 19. Dr. Rutala adds one caveat – that the person of ordinary skill in the art would have had at least four years of relevant experience.

Ex. 2023 ¶ 143.

As to Petitioner’s proposed definition, Patent Owner contends that Petitioner’s proposal “is disconnected from the disclosure of the 642 Patent as it requires no experience with antiseptics or chlorhexidine, but only a general awareness of ‘sterilization processes, sterile medical devices and/or formulations or tests for evaluating sterility.’” PO Resp. 15 (citing Pet. 15). Patent Owner argues that “Petitioner also inflated the educational requirements to a Master’s or PhD, but its expert conceded that only a Bachelor’s was required.” *Id.* (citing Ex. 2024, 42:10–15, 40:10–19). Although Patent Owner asserts that it prevails under either proposed skill level, it nonetheless argues that the definition of a person of ordinary skill in the art is important because a person of ordinary skill in the art “with familiarity with antiseptics and chlorhexidine and would be aware of the challenges facing practitioners.” *Id.* at 16.

Patent Owner further contends “Dr. Dabbah is not a [person of ordinary skill in the art] and cannot adequately opine on what was known or obvious to a [person of ordinary skill in the art] about developing sterilized chlorhexidine product/articles.” *Id.* at 16. Patent Owner concedes Dr. Dabbah is knowledgeable about sterilization generally, but argues that

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Dr. Dabbah has no experience with antiseptics or CHG specifically, and therefore, cannot opine credibly as a person of ordinary skill in the art so his testimony should be disregarded. *Id.* at 17 (citing *Kyocera Senco Indus. Tools Inc. v. ITC*, 22 F.4th 1369, 1377–78 (Fed. Cir. 2022); *Flex-Rest, LLC v. Steelcase, Inc.*, 455 F.3d 1351, 1360-61 (Fed. Cir. 2006); *Schott Gemtron Corp. v. SSW Holding Co.*, IPR2013-00358, 2014 WL 4181969, at \*10 (PTAB Aug 20, 2014) (Paper 106) (“[W]e accord the testimony . . . regarding the alleged obviousness of the claims less weight because he was not a [POSA] . . . .”); *see also* Tr. 39:1–13 (“And I’ll point out to you the fact that [Dr. Dabbah] had never read any articles about chlorhexidine gluconate prior to this case. He never even heard of ChloraPrep prior to this case. So, how [h]e could opine about how it was so obvious to sterilize chlorhexidine gluconate. You know, I think that testimony is not provided.”). According to Patent Owner, its own witness, Dr. Rutala, in contrast is a person of ordinary skill in the art and a “well-recognized expert on antiseptics including CHG and sterilization processing.” *Id.* at 17 (citing Ex. 2023 ¶¶ 5–24; Ex. 2005, 4.)

Based on the entirety of the record, we determine that a person of ordinary skill in the art at the time of the invention would have possessed at least an undergraduate Bachelor’s degree in the pharmaceutical sciences, pharmacy, biochemistry, microbiology, or a related field, with at least four years of experience with sterilization processes for medical products and their components, as well as familiarity with antiseptics such as chlorhexidine. Such level of skill in the art is consistent with the ’642 patent and the asserted prior art of record.



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Regarding Patent Owner's arguments that Dr. Dabbah is not a person of ordinary skill in the art and cannot adequately opine on what was known or obvious to a person of ordinary skill in the art about developing sterilized chlorhexidine product/articles, we first note Patent Owner did not file a Motion to Exclude Dr. Dabbah's testimony. *See* Tr. 39:19–26. As to Dr. Dabbah's qualifications, there can be no dispute that Dr. Dabbah meets the educational requirements set forth in our definition. Dr. Dabbah received a Bachelor's degree in Microbiology and Chemistry, a Masters in Dairy Microbiology, and a Ph.D. in Food Sciences and Biochemistry. Ex. 1003 ¶ 6. Nor can there be a reasonable dispute that Dr. Dabbah has at least four years of experience with sterilization processes for medical products and their components, as well as familiarity with antiseptics. *See* Ex. 1003, ¶¶ 6–17, 70, Appendix A (Dr. Dabbah's CV); Ex. 2024, 18:18–20:23 (Dr. Dabbah testifying regarding his educational and work experience, specifically that he had experience with “sterilization of . . . infant formula to validation of the process used in sterilization of those Similac products”), 22:22–23:16 (Dr. Dabbah testifying that he was personally involved in the steam and Eto sterilization processes for several products including medical devices); 37:19–38:1 (Dr. Dabbah testimony rejecting assertion that he lacked experience with antiseptics); 53:4–54:12 (Dr. Dabbah testifying regarding his familiarity with antiseptics). Accordingly, on this record as a whole, we do not agree with Patent Owner's position. Rather, we determine Dr. Dabbah qualifies as at least a person of ordinary skill in the art. Thus, we will consider his testimony in this proceeding.

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### III. ANALYSIS

#### *A. Alleged Anticipation of Claims 1–3, 5–8, 10–18 and 20 by ChloraPrep PAR*

Petitioner asserts that claims 1–3, 5–8, 10–18, and 20 are unpatentable as anticipated by the ChloraPrep PAR. Pet. 26–52. Patent Owner disagrees, arguing, *inter alia*, that ChloraPrep PAR does not disclose any of the elements recited in the independent claims. PO Resp. 23–30. Patent Owner also offers arguments with respect to the additional limitations recited in several of the independent claims. *Id.* at 30–36. And Patent Owner argues that the ChloraPrep PAR does not anticipate the challenged claims because it is not enabling. For the reasons discussed below, Petitioner has established by a preponderance of the evidence that the ChloraPrep PAR anticipates claims 1–3, 5–8, and 10–19 of the ’642 patent.

##### *1. Overview of ChloraPrep PAR (Exs. 1004, 1005)*

ChloraPrep PAR is a Public Assessment Report for “ChloraPrep with Tint 2% w/v/70%v/v Cutaneous Solution,” authored by the United Kingdom Medicines and Healthcare products Regulatory Agency (“MHRA”).<sup>4</sup> Ex. 1005, 1. ChloraPrep PAR discloses that:

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<sup>4</sup> According to Petitioner:

The UK MHRA is responsible for, *inter alia*, evaluating marketing authorization applications for drug products, and provides the basis for the authorization of medicines in the United Kingdom. Ex. 1020. In connection with this regulatory function, the MHRA publishes Public Assessment Reports (“PARs”), which include, Summaries of Product Characteristics (“SPCs”) and Product Information Leaflets (“PILs”). These regulatory reports are published to memorialize the authorization of pharmaceutical drugs and

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The Medicines and Healthcare products Regulatory Agency (MHRA) granted Enturia Limited a Marketing Authorisation (licence) for the medicinal product ChloraPrep® with Tint 2%w/v/70%v/v Cutaneous Solution (PL 31760/0001. This is a general sales medicine (GSL) and is used to disinfect the skin and help prevent infections before invasive medical procedures such as injections, insertion of catheters and minor or major surgery.

Ex. 1005, 2.

ChloraPrep PAR begins with a “Lay Summary,” which states that the ChloraPrep product “contains the active ingredients chlorhexidine gluconate 2%w/v and isopropyl alcohol 70% v/v” and goes on to state that “[t]his is a new combination of two well-known antiseptic agents.”

Ex. 1005, 2. According to ChloraPrep PAR, “[t]he rationale for development of a fixed combination product containing 2% chlorhexidine gluconate and 70% isopropyl alcohol was to develop an antiseptic with rapid onset and long lasting activity against potential pathogens.” *Id.*




ChloraPrep PAR contains a figure within the section titled “Summary of Product Characteristics” (“SPC”) (*id.* at 5–8) that depicts three different forms of applicators for the ChloraPrep product each dispensing a different volume of the chlorhexidine gluconate/isopropyl alcohol solution. *Id.* at 5. The figure is reproduced below:

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medical devices and disclose the MHRA’s reasoning and approval process.

Pet. 17.

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Applicator	Maximum Coverage Area (cm x cm)	For Procedures such as:
3 ml 	15 x 15	<ul style="list-style-type: none"> <li>- Midline &amp; Central Venous Catheter (CVC) insertion and maintenance</li> <li>- Peritoneal dialysis site cleansing</li> </ul>
10.5 ml 	25 x 30	<ul style="list-style-type: none"> <li>- Minor and major surgical procedures</li> <li>- Implantable device placement</li> <li>- Prosthetic device placement or removal</li> <li>- Midline, Peripheral Intravascular Central Catheter (PICC) &amp; CVC insertion and maintenance</li> <li>- Cardiac catheterisation and Cardiac Cath Lab procedures</li> <li>- Interventional Radiology procedure</li> </ul>
26 ml 	50 x 50	

*Id.* The above figure is a table in which the left column identifies three sizes of applicators, the middle column identifies the “Maximum Coverage Area” for each size of applicator, and the right column identifies procedures in which the differently sized applicators can be used. *Id.* The three sizes of applicator are 3 ml, 10.5 ml, and 26 ml. *Id.* “The 3 ml and 10.5 ml applicators each have a single glass ampoule within the plastic barrel. The 26 ml applicator holds two 13 ml glass ampoules.” *Id.* at 7. ChloraPrep PAR states that “[t]he applicator is removed from the wrapper and held with the sponge facing downward. The applicator is squeezed gently to break the ampoule containing the antiseptic solution, which is released onto the sponge in a controlled flow.” *Id.* at 5.

ChloraPrep PAR discloses that the pharmaceutical composition contains 20mg/ml of chlorhexidine gluconate and 0.70ml/ml of isopropyl alcohol as well as the excipient, “Sunset Yellow.” *Id.* at 5, 7. According to ChloraPrep PAR, “ChloraPrep with Tint is a sterile alcoholic antiseptic

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solution” in which “[t]he sterile applicators are individually packaged in an ethyl vinyl acetate film.” *Id.* at 7. ChloroPrep PAR instructs users to “[s]tore in the original packaging; applicator is sterile unless seal is broken.” *Id.*

ChloroPrep PAR also includes the Product Information Leaflet (“PIL”) for the product, which describes the CHG composition as a “sterile alcoholic antiseptic solution containing chlorhexidine gluconate and isopropyl alcohol in an applicator” as shown in the figure reproduced below:

**6. FURTHER INFORMATION**  
**What ChloroPrep contains**  
The active substances are chlorhexidine gluconate 20mg/ml and isopropyl alcohol 0.70ml/ml. The other ingredients are purified water and Sunset yellow (E110).  
**What ChloroPrep looks like and contents of the pack**  
ChloroPrep with Tint is a sterile alcoholic antiseptic solution containing chlorhexidine gluconate and isopropyl alcohol in an applicator. The applicators consist of a latex-free sponge attached to a plastic handle/barrel which holds a latex-free dyed pledget and glass ampoule containing the antiseptic solution. The 3ml and 10.5ml applicators each have a single glass ampoule within the plastic barrel. The 26ml applicator holds two 13ml glass ampoules. The sterile applicators are individually packaged in an ethyl vinyl acetate film.

Ex. 1005, 10. The Figure reproduced above is an excerpt from the product packaging describing “[w]hat ChloroPrep contains,” “[w]hat ChlorPrep looks like,” and the “contents of the pack.” *Id.*

## 2. Analysis of Independent Claim 1

a) preamble “a sterilized chlorhexidine product for topical disinfection, said sterilized chlorhexidine product comprising”

Claim 1 recites as its preamble “a sterilized chlorhexidine product for topical disinfection.” Ex. 1001, 27:25–26. Petitioner contends that, to the extent the preamble is limiting, the ChloroPrep PAR discloses the elements of the preamble. Pet. 27. More specifically, Petitioner contends that “[t]he sterile applicators and sterile CHG and isopropyl alcohol solution form a

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sterilized chlorhexidine product.” *Id.* at 28. As support, Petitioner points to the Product Information Leaflet (“PIL”) included in the ChloraPrep PAR, which “states that the ‘[t]he sterile applicators are individually packaged in an ethyl vinyl acetate film.’” *Id.* According to Petitioner, a skilled artisan would know that ethyl vinyl acetate “is a common material used in medical packaging to ensure that the contents of the packaging remain sterile.” *Id.* at 28 (citing Ex. 1005, 10, Ex. 1035 ¶¶ 11–13). Petitioner then argues that the statement in the ChloraPrep PAR that the “applicator is sterile unless seal is broken” confirms that the purpose of the ethyl vinyl acetate is to keep the contents of the packaging sterile. *Id.* (citing Ex. 1005, 7); *see also, id.* at 27 (quoting the statement in ChloraPrep PAR that “ChloraPrep with Tint . . . is sterile until the packaging is opened”).

Patent Owner acknowledges the statements in the ChloraPrep PAR teaching that the CHG solution and the applicator are sterile, but argues that these statements “describe the solution (limitation 1.a) and the applicator (limitation 1.b), not the product that comprises them and a [person of ordinary skill in the art] would not understand [them] to teach that the product itself is sterilized.” PO Resp. 24. Patent Owner disputes Petitioner’s assertion that both “[t]he sterile applicators and sterile CHG . . . solution form a sterilized chlorhexidine product,” arguing that “this combination does not establish that the product itself is sterile or sterilized.” *Id.* at 24–25. Patent Owner also cites a ChloraPrep Frequently Asked Questions document (“the FAQ”) from 2015 addressing questions regarding Petitioner’s ChloraPrep label change, which Patent Owner contends “proves” that there is a distinction between a sterilized product and a sterilized component of that product. *Id.* (citing statement in Ex. 2006 that

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“though all ChloraPrep applicators are sterilized . . . , the solution inside . . . is not sterile.”). Finally, Patent Owner argues that “Petitioner does not explain how the PAR discloses that its sterilization process can be validated,” as required by the Board’s claim construction. *Id.* at 25.

For the reasons discussed below, Petitioner has established by a preponderance of the evidence that the ChloraPrep PAR discloses “a sterilized chlorhexidine product for topical disinfection.”<sup>5</sup> We do not agree with Patent Owner’s arguments to the contrary.

We begin our analysis by considering the disclosure of the ChloraPrep PAR itself. The ChloraPrep PAR states: “ChloraPrep with Tint is for single use only and is sterile until the packaging is opened.” Ex. 1005, 10. The ChloraPrep PAR defines “ChloraPrep with Tint” as “a sterile alcoholic antiseptic solution . . . in an applicator.” *Id.* at 7. It then defines the applicator as consisting of “a latex-free sponge attached to a plastic handle/barrel which holds a latex-free dyed pledget and glass ampoule containing the antiseptic solution” – i.e. the entire product other than the antiseptic solution. *Id.* Thus, the ChloraPrep PAR defines “ChloraPrep with Tint” as being the entire product (applicator plus antiseptic solution). *Id.* In addition, “ChloraPrep with Tint” is the name of the product described in the ChloraPrep PAR. *Id.* at 1 (identifying the product as “ChloraPrep with Tint 2% w/v/70% v/v Cutaneous Solution”), 10 (teaching that “[t]his medicinal product is “authorised in the Member States of the EEA under the following names: . . . UK – ChloraPrep with Tint”). For these reasons, we

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<sup>5</sup> We do not determine whether the preamble is limiting because, regardless of whether the preamble is limiting, Petitioner has shown that the recitation in the preamble is satisfied by the prior art.

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find that a person of ordinary skill in the art would have understood the phrase “ChloraPrep with Tint” as used in the ChloraPrep PAR to refer to the entire product. Thus, based on the disclosure of the ChloraPrep PAR, a person of ordinary skill in the art would have understood “ChloraPrep with Tint . . . is sterile until the packaging is opened,” to mean that the entire product is sterile until the package is open.

This finding is supported by the teaching that ChloraPrep is “packaged in an ethyl vinyl acetate film.” *Id.* In this regard, we credit the testimony of Dr. Dabbah that a person of ordinary skill in the art would know that ethyl vinyl acetate “is a common material used in medical packaging to ensure that the contents of the package remain sterile.” Ex. 1003 ¶ 94.

Our finding that the entire ChloraPrep with Tint product has been sterilized is supported further by what Chiang<sup>6</sup> teaches was known about the “ChloraPrep® applicator, provided by CareFusion.” Chiang teaches that it is necessary to sterilize the exterior of the applicator for skin antiseptic applicator devices, but that doing so may compromise the antiseptic solution. Chiang explains:

One of the challenges associated with using such skin antiseptic compositions is the need to sterilize the exterior of the applicator while minimizing potential byproducts that may be produced when the composition is exposed to sterilization compounds such as ethylene oxide gas. Reactive sterilants such as ethylene oxide may react with the active antimicrobial agent or with other components in the skin antiseptic composition, altering the potency or producing potentially toxic compounds.

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<sup>6</sup> Chiang et al., U.S. Patent Publication No. 2014/0371695 A1, published Dec. 18, 2014 (“Chiang,” Ex. 2015).



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Ex. 2015 ¶ 9.

Chiang teaches that “ChloraPrep® applicator, provided by CareFusion” solves this problem by using a glass ampule to protect its antiseptic from the ethylene oxide gas used during the sterilization process:

To address this problem, various solutions have been proposed. For example, the ChloraPrep® applicator, provided by CareFusion, has the active skin antiseptic composition, containing chlorhexidine gluconate (CHG), stored in a breakable glass ampule inside the applicator device. In the ChloraPrep® applicator, the sealed glass ampule protects the CHG composition during the sterilization process from ethylene oxide penetration which could otherwise compromise the efficacy of the antiseptic composition. CareFusion has a number of patents and patent applications including: U.S. Pat. Nos. 5,772,346 and 5,752,363 and U.S. Application Publication No. 2012/003029. Each of these teach the use of a sealed glass ampule containing CHG inside a skin antiseptic applicator.

*Id.* ¶ 10. Thus, Chiang teaches that the ChloraPrep® applicator uses a glass ampule to protect CHG from the ethylene oxide used to sterilize the exterior of the applicator.

Chiang’s disclosure is consistent with Dr. Rutala’s testimony on terminal sterilization. “Terminal sterilization” is a common process where a product is placed “in some type of packaging such that the sterilant permeates and sterilizes the internal item, but the packaging prevents microorganisms from contaminating that internal item.” Ex. 1040, 190:6–20 (Dr. Rutala’s testimony). According to Dr. Rutala, one way to conduct terminal sterilization is using ethylene oxide in conjunction with a gas-permeable packaging. *Id.* at 141:18–143:6; *see also* 147:10–11 (“[A]s I alluded to, ethylene oxide is a sterilization process.”). Furthermore, Dr. Rutala explains that “most plastics are permeable” and “it is not a far

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stretch to believe that ethylene oxide permeates and is permeable to . . . ethylene-vinyl acetate.” *Id.* at 145:2–147:21.

We find that the disclosure of Chiang reflects the knowledge of a person of ordinary skill in the art at the time of the alleged invention. *See* Ex. 2023 ¶ 206 (testimony of Dr. Rutala that “Chiang set forth the prevailing knowledge that ‘In the ChloraPrep® applicator, the sealed glass ampule protects the CHG composition during the sterilization process from ethylene oxide penetration which would otherwise compromise the efficacy of the antiseptic composition”); *see also* Ex. 1003 ¶ 138 (testimony of Dr. Dabbah that “sterilization of the applicator via ETO and other sterilization processes was a well-known and routine process for a POSA”). Chiang thus reinforces our finding that the ChloraPrep PAR discloses sterilization of the entire ChloraPrep with Tint product by teaching how that sterilization is achieved: by using the combination of ETO and ethylene vinyl acetate (“EVA”) to sterilize the applicator, while relying on the glass ampule to protect the CHG from degradation caused by the ETO.

Patent Owner does not specifically discuss Chiang, but argues that Petitioner “manufactures a new theory that the PAR discloses ‘the entire product is sterile’ because ‘a POSA would understand . . . that . . . ethyl [sic] oxide gas (‘ETO’)' would penetrate ‘EVA film’ packaging.” Sur-reply 9. According to Patent Owner, “the Petition never asserted the ‘entire product’ was sterile (only the applicator and solution).” *Id.* We do not agree.

The Petition directs us to the teaching in the ChloraPrep PAR that “ChloraPrep with Tint . . . is sterile until the packaging is opened” as well as the teaching that the applicators are “individually packaged in an ethyl vinyl acetate film.” Pet. 27. The Petition also asserts that ethyl vinyl acetate is “a

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common material used in medical packaging to ensure that the contents of the package remain sterile.” *Id.* at 28. From this, we understand the Petition to assert that everything contained in ChloraPrep PAR’s ethyl vinyl acetate packaging – i.e., the entire ChloraPrep with Tint product – had been sterilized. As to the use of ethylene oxide gas to achieve sterilization, in arguing that ChloraPrep PAR was enabled, the Petition asserts that “sterilization of the applicator via, for instance, ETO was a well-known and routine process.” *Id.* at 52.

We now consider how a person of ordinary skill in the art at the critical time would have understood the term “sterile” as used in the ChloraPrep PAR. The evidence of record supports that a person of ordinary skill in the art would understand the term “sterile” as used in a U.K. regulatory document, like the ChloraPrep PAR, to mean “sterilized,” as we have construed that term here. Ex. 1003 ¶ 91 (Dr. Dabbah testimony that “using the term ‘sterile’ [in] a regulatory approval of a medical device means unequivocally that the product has been sterilized”). We credit the testimony of Dr. Dabbah, who explains, “[t]he use of the term sterile in that strict regulatory context is a term with a precise meaning.” Ex. 1003 ¶ 130.<sup>7</sup> According to Dr. Dabbah, a person of ordinary skill in the art would have

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<sup>7</sup> Dr. Dabbah’s testimony at paragraphs 129–134 addresses limitations in dependent claims 10 and 20 requiring a particular sterility assurance level. Both claims remain at issue, requiring us to consider the testimony. Although not necessary to support our factual findings with respect to claim 1, we find it helpful to consider and discuss this testimony here as it relates directly to, and further supports, our findings. For completeness, and because they also relate directly to our findings with respect to claim 1, we also consider and discuss here, the arguments made by Patent Owner in response to this testimony.

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understood the term “sterile” in a regulatory document to “unequivocally disclose[] a SAL [sterility assurance level]<sup>8</sup> from  $10^{-3}$  to  $10^{-9}$  to a POSA.” *Id.* That is because BS EN-556-1, the applicable regulatory standard, “specifies a probability of a viable microorganism on a device of  $10^{-6}$  or less (e.g.  $10^{-7}$ , et seq.) which must be achieved in order to designate a terminally sterilized medical device as ‘sterile,’ particularly in such a regulatory document.” *Id.* ¶ 131; Ex. 1017, 8 (BS EN 556-1, stating: “For a terminally-sterilized *medical device* to be designated “*STERILE*”, the theoretical probability of there being a viable micro-organism present on/in the device shall be equal to or less than  $1 \times 10^{-6}$ .”). We credit Dr. Dabbah’s testimony (Ex. 1003 ¶¶ 91, 129–134) and find that a person of ordinary skill in the art would have understood that the product described in the ChloraPrep PAR was required to comply with applicable standards, including BS EN-556-1, and thus a person of ordinary skill in the art would have understood the term “sterile” as used in the ChloraPrep PAR to require a SAL of  $10^{-6}$ .

Patent Owner seeks to undermine the argument that a person of ordinary skill in the art would have understood that the product described in the ChloraPrep PAR needed to comply with applicable regulations by arguing that “Petitioner’s declarants conceded that ‘ChloraPrep is regulated as a medicinal product’ and did not know if BS EN 556-1 was followed.” Sur-reply 15. We find these arguments misleading and unpersuasive.

Patent Owner is correct that Petitioner’s declarants, Messrs. Noble-Clark and McGinley, testified that ChloraPrep is regulated as a medicinal product. Ex. 2044, 40:1–7; Ex. 2045, 44:1–6. But that does not preclude

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<sup>8</sup> A “sterility assurance level” or “SAL” refers to “[t]he probability of survival of a single microorganism.” Ex. 1003 ¶ 132.

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that ChoraPrep was also regulated as a medical device. Indeed, Mr. McGinley testified that ChloraPrep was subject to multiple sets of regulations:

As part of my work, I am aware of the British Standard corresponding to EN556-1, which establishes the requirements for labeling a medical device as “STERILE.” I understand from my work that during the initial discussions for licensing the ChloraPrep UK products that the MHRA required that the ChloraPrep UK products, including the CHG solution, be sterilized to a SAL of  $10^{-6}$ , *consistent with the requirements of the EC Guidelines of Good Manufacturing Practice (1990) and the Ph. Eur 5.1.1* (copies of which are attached as Exs. 1048-1049 from BD’s files) *which apply to medicinal products, as well as EN556-1,] which was used to validate the sterility of the complete device.*

Ex. 1038 ¶ 16 (emphasis added). Accordingly, the testimony of Petitioner’s declarants that ChloraPrep was regulated as a medicinal product supports a finding that BS EN 556-1 was applicable to ChloraPrep with Tint, particularly when considered together with the repeated testimony from multiple sources to the same effect. *See e.g., id.*; Ex. 1037 ¶ 4; Ex. 1003 ¶ 131.

As to Patent Owner’s argument that Petitioner’s declarant was unaware whether BS EN 556-1 was followed, we find Patent Owner to have unfairly interpreted Mr. McGinley’s deposition testimony. Mr. McGinley was asked: “Do you know whether compliance with British Standard EN556-1 is documented anywhere in the dossier application for ChloraPrep with Tint?” And he responded: “Sitting here right now, I’m not in a position to say whether that specific reference was included within the dossier itself.” Ex. 2045, 118:8–14 (cited at Sur-reply 15). Being unable to say whether compliance with BS EN 556-1 was documented in a particular dossier is a

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far cry from being unable to say whether BS EN 556-1 was “followed.” Moreover, in his declaration, Mr. McGinley unequivocally testified that ChloroPrep with Tint was sterilized in a manner “consistent” with BS EN 556-1. Ex. 1038 ¶ 16. Particularly in view of this declaration testimony, we find Patent Owner’s interpretation of Mr. McGinley’s deposition testimony unhelpful and unpersuasive.

Patent Owner also raises three arguments in connection with dependent claims 10 and 20 that warrant consideration here because they relate to whether BS EN 556-1 applies to the ChloroPrep PAR. First, Patent Owner argues: “Petitioner provides no evidence that any ‘British Standard’ . . . – including BSEN556-1 directed to ‘medical devices’ – governs the use of the term ‘sterile’ in a PAR relating to topical CHG products. PO Resp. 34. Patent Owner notes that the British Standard Institution (“BSI”)<sup>9</sup> states that its “[s]tandards are voluntary in that they are tools devised for the convenience of those who wish to use them.” *Id.* at 34–35 (citing Ex. 2037; Ex. 2038; Ex. 2023 ¶¶ 287–292). We do not agree with this argument.

Petitioner provides the testimony of multiple witnesses whose testimony supports that BS EN 556-1 applied to the ChloroPrep PAR and that compliance with that standard was “required.” Ex. 1038 ¶ 16 (testimony of Mr. McGinley); Ex. 1037 ¶ 4 (Noble-Clarke testimony); Ex. 1003 ¶ 131 (testimony of Dr. Dabbah). And BS EN 556–1 itself repeatedly uses mandatory language in connection with its sterilization standards. *See, e.g.*, Ex. 1017, 1 (“Sterilization of medical devices – ***Requirements*** for medical devices to be designated ‘STERILE’”; “Part 1:

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<sup>9</sup> According to Dr. Rutala, BSI is the organization that publishes the British Standards, which include BS EN 556-1. Ex. 2023 ¶ 288.

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**Requirements** for terminally sterilized medical devices”), 3 (same), 6 (“European Standards for *medical devices* **require**, when it is necessary to supply a *sterile* product item, that adventitious microbiological contamination of a *medical device* from all sources is minimized by all practical means”; “This European Standard specifies the **requirements** for a terminally-sterilized *medical device* to be designated ‘*STERILE*.’”), 8 (section heading “**Requirements**” setting forth the standard that “For a terminally-sterilized medical device to be designated “STERILE”, the theoretical probability of there being a viable micro-organism present on/in the device **shall be** equal to or less than  $1 \times 10^{-6}$ .”) (bolded emphasis added).

We recognize that the British Standards Institution website states that the “[s]tandards are voluntary in that they are tools devised for the convenience of those who wish to use them.” Ex. 2037. We also acknowledge Dr. Rutala’s opinion that Dr. Dabbah has not shown that the ChloroPrep PAR was required to comply with BS EN 556-1. Ex. 2023 ¶ 292. To the extent this evidence conflicts with the evidence provided by Petitioner that compliance was required, we find Petitioner’s evidence more persuasive. In this regard, we credit the testimony Dr. Dabbah, and Messrs. Noble-Clarke and McGinley as well as the evidence provided by BS EN 556-1 itself over the evidence provided by Patent Owner on this topic.

Second, Patent Owner argues that BS EN 556-1 “defines ‘Medical Device’ to exclude products that ‘achieve [their] principal intended action in or on the human body by pharmacological . . . means.’” PO Resp. at 35. Patent Owner also argues that the ChloroPrep PAR “identifies ChloaPrep as a ‘medicinal product’ – not a ‘medical device.’” *Id.* (internal citation to Ex. 1005, 2 omitted). And Patent Owner argues that the MHRA classifies

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chlorhexidine topical antiseptics as ‘medicinal products’ – not ‘medical devices.’” *Id.* (citing Ex. 2039, 48–50; Ex. 2023 ¶¶ 296–297). We do not find these arguments compelling.

As discussed above, multiple witnesses testify that BS EN 556-1 applied to the ChloraPrep PAR. We credit these witnesses over Patent Owner’s interpretation of BS EN 556-1. Moreover, we do not read BS EN 556-1 to exclude the ChloraPrep PAR. Although Patent Owner is correct that BS EN 556-1 defines “medical device” to exclude devices that “achieve [their] principal intended action in or on the human body by pharmacological, immunological or metabolic means,” BS EN 556-1 expressly includes within its definition, devices which are “assisted in [their] function by such means.” Ex. 1017, 7. To the extent ChloraPrep PAR’s CHG composition is considered to be pharmacological means, we find that the CHG composition assists the applicator in its function, and thus we find the product described in the ChloraPrep PAR falls within the scope of BS EN 556-1. As to Patent Owner’s argument that the ChloraPrep PAR identifies and the MHRA classifies ChloraPrep as a “medicinal product,” as discussed above, we find that this does not preclude it also being subject to standards for medical devices.

Third, Patent Owner argues that “BS EN 556-1 states that the medical device can be designated ‘sterile’ if it is ‘terminally-sterilized’ (Part 1) or ‘aseptically processed’ (Part 2).” PO Resp. 36 (citing Ex. 1017, 6). This is significant, Patent Owner argues, because Part 2 of the BSI “states that aseptically-processed products can include unsterilized components.” *Id.*

We do not agree with this argument because Petitioner provides testimony from multiple witnesses that BS EN 556-1 applies to the



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ChloraPrep PAR and Patent Owner does not direct us to any evidence that BS EN 556-2, i.e., Part 2, applies. Moreover, based on our review of BS EN 556-2, it does not appear to apply to the ChloraPrep PAR. BS EN 556-2 states:

Medical devices designated “STERILE” are prepared using appropriate and validated methods. Whenever possible, sterile medical devices are terminally-sterilized using a properly validated and controlled sterilization process (see EN 556-1, EN 550, EN 552, EN 554 and EN ISO 14937). When a medical device is intended to be sterile but cannot be terminally-sterilized, aseptic processing is the method of manufacture (see EN 13824 and EN ISO 14160).

Ex. 2013, 6. Thus, BS EN 556-2 only applies when a medical device “is intended to be sterile but cannot be terminally-sterilized.” Here, there is no evidence that ChloraPrep PAR cannot be terminally sterilized. Indeed, as discussed *supra*, the evidence is to the contrary.

With respect to Patent Owner’s argument that the Petitioner has not shown that the sterility of ChloraPrep with Tint has been validated, we note that Petitioner has shown that BS EN 556-1 required products to have a particular SAL. On cross-examination, Dr. Rutala conceded that “you have to have a validated sterility process to have a sterility assurance level.”

Ex. 1043, 159:20–25. This supports that a person of ordinary skill in the art would have understood the ChloraPrep PAR to disclose a product with a validated sterility process. *Id.*; *see also* Ex. 1003 ¶¶ 129–134 (Dr. Dabbah testimony on use of the word “sterile” in a regulatory context as requiring a specific SAL); Ex. 1017, 6 (BS EN 556-1, stating: “designation of a medical device as “*STERILE*” is only permissible when a validated sterilization process has been applied.”); 2013, 6 (BS EN 556-2, stating: “Medical

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devices designated ‘STERILE’ are prepared using appropriate and validated methods.”).

*b) “sterilized chlorhexidine gluconate composition”*

Claim 1 recites a “sterilized chlorhexidine gluconate composition.” Ex. 1001, 27:27. Petitioner contends ChloraPrep PAR discloses this limitation. Pet. 28 (citing Ex. 1003 ¶ 95). According to Petitioner ChloraPrep PAR’s “Module 2 . . . describes . . . in Section 6.5 (‘Nature and contents of container’), that the solution is sterile: ‘ChloraPrep with Tint is a *sterile* alcoholic antiseptic solution containing chlorhexidine gluconate and isopropyl alcohol in an applicator.” *Id.* at 29 (citing Ex. 1005, 7; Ex. 1003 ¶ 95; Ex. 1001, 16:25-29). In addition, Petitioner points to ChloraPrep PAR’s Product Information Leaflet (“PIL”), which, like Module 2, Section 6.5, describes the chlorhexidine gluconate composition as a “sterile alcoholic antiseptic solution containing chlorhexidine gluconate and isopropyl alcohol in an applicator.” *Id.* (citing Ex. 1005, 10). Petitioner then argues that ChloraPrep PAR’s Module 5 includes a “discussion regarding the acceptance and validation of the methods for manufacturing the sterile CHG solution and applicator, further confirming the validated sterility of the device and solution.” *Id.*

As discussed above, Patent Owner argues the phrase “a sterilized chlorhexidine gluconate composition” means the “component or composition has been subjected to a suitable sterilization process such that sterility can be validated.” PO Resp. 17–20; *see* § II.C, *supra*. Based on this construction, Patent Owner contends the description “sterile” is not the same as “sterilized.” PO Resp. 21–22. Patent Owner argues:

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While the PAR refers to “a sterile alcoholic antiseptic solution . . . in an applicator,” the word “sterile” had questionable meaning as used with regard to antiseptics in 2010, particularly given the ChloraPrep label change described in 2015 that clarified the product previously labelled as “sterile” was in fact “nonsterile.” (*Id.*; Ex. 2006; Ex. 2009, 26, 34, 43, 50, 57.) Thus, the PAR’s use of the word “sterile” at that time did not teach that ChloraPrep or its CHG composition were sterilized or that it could contain, deliver, and apply the sterilized composition.

Nothing in the PAR suggests to a POSA that it is describing anything other than an antiseptic capable of acting as an antimicrobial. (Rutala ¶176.) That is particularly true since, as the Board recognized, Petitioner cites no prior art describing any known methods of sterilizing chlorhexidine gluconate as of 2010. (Dec. 33; §II.C.; Rutala ¶¶172-175.) Indeed, the public knowledge well after 2010 was that, “[i]n the ChloraPrep® applicator, the sealed glass ampule protects the CHG composition during the sterilization process . . . which could otherwise compromise the efficacy of the antiseptic composition” and “the solution inside of the [ChloraPrep] applicators is not treated with a separate sterilization process and, therefore, is not sterile.” (*Id.*; Ex. 2015, ¶10; Ex. 2006, 1.)

*Id.* at 22–23. Patent Owner cites to the FAQ to support its position. PO Resp. 25–26 (citing Ex. 2006). The FAQ document discloses: “[t]hough all ChloraPrep applicators are sterilized at the end of the manufacturing process, the solution inside of the applicators is not treated with a separate sterilization process and, therefore, is not sterile.” Ex. 2006, 1. Thus, Patent Owner argues “nothing in the PAR teaches that the solution is sterilized” and, more specifically, “[t]here is no disclosure of exposing any component of the product to a suitable sterilization process such that sterility can be validated.” PO Resp. 26. Finally, Patent Owner argues that “Petitioner

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failed to show that the CHG composition had been subjected to validated sterility processing.” *Id.* at 27.

In determining whether the ChloraPrep PAR discloses “a sterilized chlorahexidine gluconate composition,” we begin our analysis with the document itself. The ChloraPrep PAR states that its antiseptic is “a sterile alcoholic antiseptic solution containing chlorhexidine gluconate and isopropyl alcohol.” Ex. 1005, 7; *see also id.* at 10 (same). This strongly supports that the solution is sterilized. In this regard, we credit the testimony of Dr. Dabbah, who states:

Based on my extensive expertise with both the development of international standards for sterile products and sterilization, and my regulatory experience complying with the same, using the term ‘sterile’ to a regulatory approval of a medical device means unequivocally that the product has been sterilized.

Ex. 1003 ¶ 91; *see also id.* ¶¶ 129–134. For the reasons discussed, *supra* § III.A.2.a., we find that a person of ordinary skill in the art would have understood BS EN 556-2 to apply to the ChloraPrep PAR and we do not agree with Patent Owner’s arguments to the contrary. The totality of the evidence supports that a person of ordinary skill in the art would have understood the ChlorPrep PAR described the “alcoholic antiseptic solution” as being sterilized, as claimed.

In addition to teaching that the antiseptic solution is sterilized, the ChloraPrep PAR separately states that the applicators are “sterile.” Ex. 1005, 7 (“The sterile applicators are individually packaged in ethyl vinyl acetate.”), 10 (same). By separately describing “a sterile alcoholic antiseptic solution” and “sterile applicators,” the ChloraPrep PAR suggests that each

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component – the antiseptic solution and the applicators – has been separately sterilized. This also supports that the solution has been sterilized.

Patent Owner and Dr. Rutala cite the FAQ to support that “the word ‘sterile’ had questionable meaning as used with regard to antiseptics in 2010, particularly given the ChloroPrep label change described in 2015 that clarified the product previously labelled as ‘sterile’ was in fact ‘nonsterile.’” PO Resp. 22. Thus, according to Patent Owner, a person of ordinary skill in the art would have understood that the CHG solution disclosed in the ChloroPrep PAR is not sterilized. PO Resp. 26 (citing Ex. 2006 (the FAQ); Ex. 2023 ¶¶ 206–208 (Dr. Rutala’s testimony, which cites Ex. 2006)). While this argument has some superficial appeal, we do not agree with it when considering the FAQ in the context of known differences between products and regulations in the U.S. and in Europe.

The FAQ was generated after the U.S. Food and Drug Administration (“FDA”) requested that “all manufacturers . . . voluntarily revise the product labels for topical antiseptics to indicate whether the drug is manufactured as a sterile or nonsterile product.” Ex. 2006, 1. “CareFusion adhered to the request and submitted revised labeling to the FDA.” *Id.* In connection with this label change, CareFusion issued a document responding to frequently asked questions, like: “Why is CareFusion updating the ChloroPrep® label to state ‘nonsterile solution?’” *Id.*

The FAQ includes several statements that support that the antiseptic solution in the product that was the subject of the label update is not sterilized. For example, the FAQ states: “Though all ChloroPrep applicators are sterilized at the end of the manufacturing process, the solution inside of the applicators is not treated with a separate sterilization process and,

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therefore, is not sterile.” Ex. 2006, 1. And the FAQ states “[c]urrently, sterile chlorhexidine gluconate-based products are not available because an efficient method does not exist to sterilize these antiseptic solutions on a large scale and within a time frame that meets customer demand.” *Id.*<sup>10</sup>

Importantly, however, the FAQ is directed to a product marketed in the United States. Ex. 2006, 1 (explaining that revised label was responsive to request from the U.S. Food and Drug Administration). In contrast, the ChloroPrep PAR is a regulatory filing by the MHRA concerning authorization to market ChloroPrep with Tint in the United Kingdom. Ex. 1005, 1 (identifying “UK licence no: PL 31760/0001”), 10 (stating that the “[t]his medicinal product is authorized in the Member States of the EEA under the following names: . . . UK – ChloroPrep with Tint”), 14 (identifying the United Kingdom as the “Reference Member State” for the marketing authorization).

The distinction between the U.S. ChloroPrep product and the U.K.’s ChloroPrep product is significant because, as Degala teaches, the U.S. and European Union countries have different regulations regarding sterilization

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<sup>10</sup> The FAQ also states: “Unless a product says ‘sterile solution’ on the label, health care professionals should be aware that they are using a nonsterile solution product.” Ex. 2006, 1. This suggests that if a product is labeled “sterile solution,” the solution is sterile. In this regard, we note that the CloroPrep PAR states that the product has a “sterile solution” but the pre-label change packaging for the U.S. ChloroPrep product does not. *Compare* Ex. 1006, 7, 10 (U.K. packaging disclosing a “sterile alcoholic antiseptic solution”), *with* Ex. 2009 (U.S. pre-label change packaging, stating “sterile” and stating “[a]pplicator is sterile if package is intact,” but not separately calling out the solution as “sterile”).

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requirements and, a CareFusion product with sterilized CHG is manufactured for EU countries:

In the United States there are currently no regulations regarding the sterilization requirements of topical antiseptic solutions. Therefore, antiseptic solutions currently sold in the United States generally do not undergo a sterilization process. In other jurisdictions, however, such as European Union (EU) countries, some degree of sterilization is required. A known antiseptic solution containing 2% w/v chlorhexidine gluconate in 70% v/v isopropanol in water, manufactured by CareFusion Corp., is sterilized for EU countries using a known sterilization method.

Ex. 1007 ¶ 2. Patent Owner argues that this statement “has no bearing on ‘sterile’ in the [ChloraPrep] PAR” because “[t]here is no evidence that anyone in the public (including Dr. Dabbah) knew of any ‘sterilized’ ChloraPrep UK product or UK requirement about sterilizing CHG” and Petitioner “never contended that a POSA would be a UK regulatory expert versed in ChloraPrep.” Sur-reply. 13–14. We disagree.

Degala itself teaches that the chlorhexidine gluconate in a product made by CareFusion Corp, and matching the description of the product described in the ChloraPrep PAR, “is sterilized for EU countries.” *Compare* Ex. 1007 ¶ 2 (disclosing antiseptic solution containing 2% w/v chlorhexidine gluconate in 70% v/v isopropanol in water), *with* Ex. 1005, 5 (disclosing antiseptic solution containing “[c]hlorhexidine gluconate 20mg/ml” and “[i]sopropyl alcohol 0.70ml/ml”). And, two of Petitioner’s employees confirm that the version of the CloraPrep product sold in the U.K. had sterilized chlorhexidine gluconate. Ex. 1037 ¶¶ 2, 7 (testimony from Simon Noble-Clarke, the person who was “primarily responsible for the ChloraPrep product line as sold in the UK/Ireland,” that “the ChloraPrep UK product,

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unlike the US product was fully sterilized, including both the solution and the complete product”); Ex. 1038 ¶¶ 3, 4, 6, 10 (testimony of Christopher McGinley, who helped to support ChloraPrep products as sold in the US and as sold under license from the MHRA in the UK and EU, that “the CHG solution in the ChloraPrep UK product is sterilized to a SAL of  $10^{-6}$  and has been since it was first sold in the UK” and that “the CHG solution in the ChloraPrep US products was not sterilized, nor was it required by the FDA to be sterilized.”).<sup>11</sup> Finally, in response to questions at an FDA hearing about sterile chlorhexidine gluconate products that were available overseas, Timothy P. Manthei, who is listed as an inventor of the ’642 patent, admitted to having heard of such a product, responding “I have heard that, that there’s a formulation out there, but I don’t know what it is, or how it’s used, or how they got to sterilization.” Ex. 1044, 41; Ex. 1001 code (72). Accordingly, the record supports that information about a product with a sterilized CHG composition was available to and known by the public, and a POSA considering the ChloraPrep PAR would have known this.

As to Patent Owner’s attempt to discount the difference in regulatory regimes between the U.S. and the U.K. by arguing that “Petitioner never contended that a POSA would be a UK regulatory expert,” we have already found that a person of ordinary skill in the art would have understood that the product described in the ChloraPrep PAR was required to comply with

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<sup>11</sup> We do not agree with Patent Owner’s argument that Messrs. Noble-Clark and McGinley lacked personal knowledge of the pertinent facts. Sur-reply 11 n.6. Both witnesses were employed in roles that we expect would provide them personal knowledge as to whether the CHG solution in the UK ChloraPrep product was separately sterilized during the relevant time period. Ex. 1037 ¶¶ 1–3; Ex. 1038 ¶¶ 1–4, 6.



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applicable standards, including BS EN-556-1. *See supra* § III.A.2.a. We credit the testimony of Dr. Dabbah that a person of ordinary skill in the art would have been “very familiar” with processes for validating the sterility of various products to industry standards and “would consider them routine.” Ex. 1003 ¶ 71. Implicit in developing these processes for validating sterility is an understanding of what the standards require in order to establish sterility. *Id.* We further credit the testimony of Dr. Dabbah that a person of ordinary skill in the art would “immediately understand . . . that U.K. and European standards for SAL applied to the *ChloraPrep PAR*.” *Id.* ¶ 133; *see also* Ex. 1040, 199:24–200:18 (Dr. Rutala testimony that “I would agree that it’s likely that a POSA would be aware of ISO standards. And likely, they would be aware of the ISO standards for steam sterilization or moist heat as well as ethylene oxide, dry heat.”).

Moreover, both parties agree that a person of ordinary skill in the art would have at least four years of industry experience. Pet. 15; PO Resp. 15; Ex. 2023 ¶ 143. Our definition of the POSA reflects this. *See supra* § II.D. We find it implausible that someone with four years of experience with sterilization processes for medical products and their components would lack familiarity with the regulatory regimes that set the conditions under which the products or processes they work with may be used.

Accordingly, we do not agree with Patent Owner’s argument that a person of ordinary skill in the art would have understood the word “sterile” as used with regard to antiseptics in the *ChloraPrep PAR* to have “questionable meaning” in view of the U.S. label change. We find that a person of ordinary skill in the art would have been aware of regulatory differences between the U.S. and the U.K. and would have been aware that a

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product with a sterilized CHG solution was sold in Europe. With this understanding, a person of ordinary skill in the art would not have found the word “sterile” in the ChloroPrep PAR to have “questionable meaning.” To the contrary, as discussed above, a person of ordinary skill in the art would have understood the term “sterile” in a regulatory document to have a specific meaning, and thus understood the phrase “a sterile alcoholic antiseptic solution containing chlorhexidine gluconate and isopropyl alcohol” in the ChloroPrep PAR to refer to a sterilized CHG solution. *See* Ex. 1005, 7, 10; Ex. 1003 ¶¶ 91, 129–134.

Patent Owner next argues that a person of ordinary skill in the art “would not conflate ‘sterile’ in the PAR with ‘sterilized’” particularly given that “Petitioner identifies no known methods of sterilizing CHG existing in 2010,” the date when the ChloroPrep PAR was published. PO Resp. 26. According to Patent Owner, in 2010, it was thought that “sterilization was unnecessary because antiseptics ‘demonstrate a broad spectrum of antimicrobial activity.’” *Id.* (citing Ex. 1008). In addition, Patent Owner argues that in 2010, it was known that ChloroPrep’s glass ampules prevented sterilization of the solution within them. *Id.* (citing Ex. 2015 (Chiang, which was discussed *supra* § III.A.2.a)). We do not agree with these arguments.

There is some support in the record for Patent Owner’s argument that a person of ordinary skill in the art in 2010 would have thought that sterilization of antiseptic solutions was unnecessary. *See e.g.*, Ex. 1008 ¶ 178 (Scholz, disclosing that “[m]any of the compositions of [Scholz’s] invention demonstrate a broad spectrum of antimicrobial activity and thus are generally not terminally sterilized.”); Ex. 1007 ¶ 2 (Degala, teaching that “[i]n the United States there are currently no regulations regarding the

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sterilization requirements of topical antiseptic solutions”). There also is support in the record for the proposition that a person of ordinary skill in the art in 2010 would have thought sterilization of antiseptic solutions was important. Ex. 2023 ¶¶ 54–55 (Dr. Rutala, explaining that “[a]round 2010 to 2011, a serious infectious outbreak occurred that was linked to contamination of antiseptic alcohol swabs” and that, “[b]y the early 2010s, the concerns about contamination of antiseptic products became a significant concern”). However, it is irrelevant whether a person of ordinary skill in the art would have thought sterilization of antiseptics was necessary as of 2010 because, we do not agree that a person of ordinary skill in the art would have understood that CareFusion, the author of the ChloraPrep PAR, could describe an antiseptic solution as “sterile” in a regulatory document when it was not, in fact, sterile.

As to Patent Owner’s argument that the Petitioner does not identify known methods of sterilizing CHG dating back to the ChloraPrep PAR’s publication date, Petitioner cites Scholz, which was published in 2006, as disclosing “sterilizing the claimed chlorhexidine gluconate solution composition via any number of “industry standard techniques,” including electron beam, gamma radiation, or heat.” Pet. 14 (citing Ex. 1008 ¶ 178). The parties dispute whether Scholz teaches sterilized CHG. The relevant disclosure from Scholz is reproduced below.

Many of *the compositions* of [Scholz’s] invention demonstrate a broad spectrum of antimicrobial activity and thus are generally not terminally sterilized but if necessary may be sterilized by a variety of industry standard techniques. For example, it may be preferred to sterilize *the compositions* in their final packaged form using electron beam. It may also be possible to sterilize *the sample* by gamma radiation or heat. Other forms

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of sterilization may be acceptable. It may also be suitable to include preservatives in *the formulation* to prevent growth of certain organisms. Suitable preservatives include [list of compounds], as well as combinations of these compounds.

Ex. 1008 ¶ 178 (emphasis added). Dr. Dabbah testifies that this disclosure “describes sterilizing the claimed gluconate solution composition” using techniques that a person of ordinary skill in the art “would have been familiar with.” Ex. 1003 ¶ 75. Dr. Rutala disagrees asserting that “Scholz suggests that sterilization processes can be used on packaging, but provides no successful methods for sterilizing a CHG composition within that packaging.” Ex. 2023 ¶ 78; *see also, generally, id.* ¶¶ 74–78.

Despite Dr. Rutala’s testimony, Scholz states, unequivocally, that “the compositions of [Scholz’s] invention . . . may be sterilized by a variety of industry standard techniques.” Ex. 1008 ¶ 178. And this disclosure is presumed enabled. *In re Sasse*, 629 F.2d 675, 681 (CCPA 1980); *see also In re Antor Media Corp.*, 689 F.3d 1282, 1288 (Fed. Cir. 2012). As are Scholz’s disclosures regarding sterilizing “the compositions . . . using electron beam” and sterilizing “the sample by gamma radiation or heat.” *Id.* Dr. Rutala does not explain why a person of ordinary skill in the art would have understood Scholz to disclose sterilization of only the packaging. *See* Ex. 2023 ¶¶ 74–78. Nor does Dr. Rutala provide sufficient evidence or a compelling explanation why a person of ordinary skill in the art would disregard Scholz’s teaching that “a variety of industry standard techniques,” including, e.g., an “electron beam,” and “heat,” can be used to sterilize “the composition” and/or “the sample.” Absent such explanation or evidence, we do not credit Dr. Rutala’s opinions on Scholz. *See In re Am. Acad. of Sci.*

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*Tech Ctr.*, 367 F.3d 1359, 1368 (Fed. Cir. 2004) (“[T]he Board is entitled to weigh the declarations and conclude that the lack of factual corroborations warrants discounting the opinions expressed in the declarations.”).

Even if we were to credit Dr. Rutala’s testimony, and disregard Scholz as evidence that it was known CHG could be sterilized as of 2006, we would still disagree with Patent Owner’s argument that the absence of knowledge about techniques for sterilizing CHG in 2010 supports that a person of ordinary skill in the art would have understood the ChloroPrep PAR to disclose an unsterilized composition. In this regard, we note that one of the inventors of the ’642 patent stated, on December 12, 2012, that he was aware of a sterilized CHG product sold in Europe. Ex. 1044, 1, 20 (statement of ’642 patent inventor Timothy P. Manthei at December 12, 2012, FDA hearing). This supports that a person of ordinary skill in the art would have known that sterilization of CHG was possible at least as early as December 2012. Consistent with this finding, Degala describes a sterilization process for CHG as prior art *to Degala*, which was filed on January 8, 2014. Ex. 1007 ¶ 2 (“A known antiseptic solution containing [CHG] . . . is sterilized for EU countries *using a known sterilization method.*”) (emphasis added). Given that it was known that CHG could be sterilized shortly after the publication of the ChloroPrep PAR, we do not agree that a person of ordinary skill in the art, reading the ChloroPrep PAR at the time of the invention, would have understood “sterile alcoholic antiseptic solution containing chlorhexidine gluconate and isopropyl alcohol” to refer to an unsterilized CHG solution. To the contrary, particularly in light of the applicable regulations discussed above, we find

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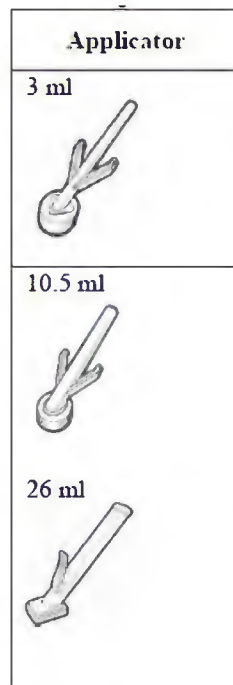
that a person of ordinary skill in the art would have understood it to refer to sterilized CHG.

With respect to Patent Owner’s argument that Petitioner has not shown that the sterility of CHG in the product disclosed in the ChloroPrep PAR has been validated, we note, as we did above in connection with the preamble, that Petitioner has shown that BS EN 556-1 requires products to have a particular SAL. On cross-examination, Dr. Rutala conceded that “you have to have a validated sterility process to have a sterility assurance level.” Ex. 1043, 159:20–25. This supports a conclusion that a person of ordinary skill in the art would have understood the ChloroPrep PAR to disclose a product in which CHG had been sterilized using a validated sterility process. *Id.*; see Ex. 1003 ¶¶ 129–134.

c) *“an applicator for facilitating application of the sterilized chlorhexidine composition”*

Petitioner contends ChloroPrep PAR discloses “an applicator for facilitating application of the sterilized chlorhexidine composition” as required by claim 1. Pet. 30 (citing Ex. 1003 ¶ 96). Petitioner relies on the Figure from page 5 of ChloroPrep PAR, reproduced, as excerpted by Petitioner, below.

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*Id.* (citing Ex. 1005, 5). The figure excerpted above depicts three differently size applicators (3 ml, 10.5 ml, and 26 ml). *Id.* “The applicators consist of a latex-free sponge attached to a plastic handle/barrel which holds a latex-free dyed pledget and glass ampoule containing the antiseptic solution.”

Ex. 1005, 7.

Patent Owner argues that “a POSA at the time [would have understood] that the challenge was not only creating a sterilized CHG composition but also providing for an applicator that facilitated application of it.” PO Resp. 27. Patent Owner further argues that “Petitioner identifies an applicator, but does not address how it is configured to facilitate application of a sterilized composition.” *Id.* We do not agree with this argument.

The Petition and Dr. Dabbah explain how the applicator facilitates application of CHG by block quoting Section 4.2 of the ChloroPrep PAR,

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which discusses how the applicator is used. Pet. 32; Ex. 1003 ¶ 98. The quoted passage reads as follows:

The applicator is removed from the wrapper and held with the sponge facing downward. The applicator is squeezed gently to break the ampoule containing the antiseptic solution, which is released onto the sponge in a controlled flow (for the 26 ml applicator the lever is pressed). The broken ampoule remains safely contained within the applicator. The sponge is gently pressed against the patient's skin in order to apply the antiseptic solution. A back and forth action of the sponge should be used for 30 seconds.

Ex. 1005, 5. This passage makes clear that the configuration of the applicator facilitates application of CHG by providing a convenient way to release a controlled flow of antiseptic solution in such a way that it can be applied to the patient's skin. Accordingly, we agree with Petitioner that the ChloraPrep PAR discloses an applicator for facilitating application of a composition.

d) *“a receptacle containing the sterilized chlorhexidine gluconate composition to provide the sterilized chlorhexidine gluconate composition to impregnate the applicator when the receptacle is compromised”*

Petitioner contends the ChloraPrep PAR discloses “a receptacle containing the sterilized chlorhexidine gluconate composition to provide the sterilized chlorhexidine gluconate composition to impregnate the applicator when the receptacle is compromised” as required by claim 1. Pet. 32–33 (citing Ex. 1003 ¶¶ 99–100). Petitioner argues that the ChloraPrep PAR describes “a receptacle in the form at least one glass ampoule housed within the applicator's plastic barrel which contains the sterilized CHG composition.” *Id.* (citing Ex. 1005, 7, 18). According to



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Petitioner, “[w]hen compromised by breaking it (‘the applicator is squeezed gently to break the ampoule’), the ampoule provides the sterilized CHG composition to impregnate the applicator by releasing the CHG into the sponge portion of the applicator (‘the antiseptic solution . . . is released onto the sponge in a controlled flow’).” *Id.* Petitioner quotes from Section 4.2 of the ChloroPrep PAR (quoted *supra* § III.2.c) to support its position. Pet. 32–33.

Patent Owner argues:

While Petitioner identifies a “glass ampoule containing the antiseptic solution,” Petitioner does not identify anything in the PAR that indicates the ampoule contains a sterilized composition or how it is configured “to provide the sterilized CHG composition to impregnate the applicator when the receptacle is compromised.” (Rutala ¶¶ 216–219.) Petitioner’s arguments simply assume the element.

PO Resp. 27–28. We do not agree with this argument.

For the reasons discussed *supra* § III.A.2.b, we find that a person of ordinary skill in the art would have understood the ChloroPrep PAR to disclose a sterilized CHG composition. Thus, we do not agree with Patent Owner’s argument that “Petitioner does not identify anything in the PAR that indicates the ampoule contains a sterilized composition.” The Petition also explains that “[w]hen compromised by breaking it (‘the applicator is squeezed gently to break the ampoule’), the ampoule provides the sterilized CHG composition to impregnate the applicator by releasing the CHG into the sponge portion of the applicator (‘the antiseptic solution . . . is released onto the sponge in a controlled flow’).” Pet. 33 (block quoting Section 4.2 of the ChloroPrep PAR). The Petition thus explains that the ampoule is configured such that it is breakable and such that it releases the antiseptic

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solution into the sponge when it is broken. *Id.* For this reason, we do not agree with Patent Owner’s argument that Petitioner “does not identify anything in the PAR that indicates . . . how [the ampule] is configured ‘to provide the sterilized CHG composition to impregnate the applicator when the receptacle is compromised.’” PO Resp. 27–28.

Based on the disclosure in ChloraPrep PAR of an ampule that is broken to release a CHG composition, we agree with Petitioner that the ChloraPrep PAR discloses a receptacle that impregnates the applicator with chlorhexidine gluconate when the receptacle is compromised.

*e) “wherein the sterilized chlorhexidine gluconate composition comprises chlorhexidine gluconate and alcohol”*

Petitioner contends ChloraPrep PAR discloses that “the sterilized chlorhexidine gluconate composition comprises chlorhexidine gluconate and alcohol” as required by claim 1. Pet. 34–35 (citing Ex. 1005, 4, 5, 7, 10; Ex. 1003 ¶¶ 101–02). Patent Owner argues that Petitioner “does not explain how” the ChloraPrep PAR discloses “that *both* the CHG and alcohol have been subjected to the requisite sterilization process.” PO Resp. 28.

For the reasons discussed *supra* § III.A.2.b, we find that a person of ordinary skill in the art would have understood the ChloraPrep PAR to disclose a sterilized CHG composition. As to the argument that Petitioner has not established that both the CHG and the alcohol have been sterilized, the ChloraPrep PAR discloses “a sterile alcoholic antiseptic solution containing chlorhexidine gluconate and isopropyl alcohol.” Ex. 1005, 7. The word “sterile” in this disclosure modifies the term “solution,” and the “solution” is described as “containing chlorhexidine gluconate and isopropyl alcohol.” *Id.* Accordingly, we find that a person of ordinary skill in the art

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would have understood that both the CHG and the alcohol in the “sterile alcoholic antiseptic solution” had been sterilized.

3. *Analysis of Independent claim 12*

a) *preamble “a method of using a sterilized chlorhexidine article, said method comprising”*

Claim 12 recites a “method of using a sterilized chlorhexidine article.” Ex. 1001, 28:15–16. Petitioner contends that to the extent the preamble is limiting, the ChloraPrep PAR discloses the elements of the preamble. As proof, Petitioner directs us to its poof with respect to the preamble of claim 1, which we discussed *supra* § III.A.2.a. Pet. 35. In addition, Petitioner directs us to Section 4.2 of the ChloraPrep PAR, which Petitioner contends provides “a detailed explanation of use of the product for topical disinfection, including choice of size of applicator and particular procedure requiring topical disinfection.” *Id.* (citing Ex. 1005, 5). According to Petitioner, “Section 4.2 specifically teaches the steps for using the product for topical disinfection.” *Id.* at 35–36 (citing Ex. 1005, 5, 9).

Patent Owner argues: “Petitioner failed to explain how the ‘sterilized . . . article’ is disclosed for the same reasons it failed to explain how a ‘sterilized . . . product’ is disclosed.” PO Resp. 49. More specifically, Patent Owner argues that “[t]he PAR does not disclose that the article as a whole is sterile, let alone subjected to a suitable sterilization process where sterility can be validated.” *Id.* We do not agree with Patent Owner’s arguments for the reasons discussed *surpa* § III.A.2.a.

We find that the ChloraPrep PAR discloses a method of using the product it describes. Ex. 1005, 5, 9. Furthermore, for the reasons discussed *supra* § III.A.2.a, a person of ordinary skill in the art would have understood

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the ChloraPrep PAR to disclose that the entire produced described in the ChloraPrep PAR was sterilized. Accordingly, we find that the ChloraPrep PAR discloses a sterilized chlorhexidine article.<sup>12</sup>

*b) “providing a sterilized chlorhexidine article”*

Claim 12 recites the step of “providing a sterilized chlorhexidine article.” Ex. 1001, 28:17–18. Petitioner contends that the ChloraPrep PAR discloses this claim element, and directs us to its proof for the preamble of claim 1, which we discussed *supra* § III.A.2.a. Pet. 36. Petitioner then directs us to its proof that the article is comprised of an applicator, a receptacle, and a solution of chlorhexidine gluconate and alcohol. *Id.* Finally, Petitioner notes that the ChloraPrep PAR describes using the article for topical disinfection. *Id.*

Patent Owner relies on the same arguments it made with respect to the preamble of claim 12, which we discussed *supra* § III.A.3.a. PO Resp. 36. For the reasons discussed *supra* § III.A.3.a, we find that the ChloraPrep PAR discloses a sterilized chlorhexidine article.

*c) “a sterilized chlorhexidine gluconate composition comprising chlorhexidine gluconate and alcohol”*

Claim 12 recites “a sterilized chlorhexidine gluconate composition comprising chlorhexidine gluconate and alcohol.” Ex. 1001, 28:19–20. This limitation overlaps with the limitations of claim 1 discussed *supra* §§ III.A.2.b and III.A.2.e. Petitioner relies on the same proof discussed in

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<sup>12</sup> As with claim 1, we do not determine whether the preamble to claim 12 is limiting because, regardless of whether the preamble is limiting, Petitioner has shown that the recitation in the preamble is satisfied by the prior art.

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those sections and Patent Owner relies on the same arguments in opposition. Pet. 37; PO Resp. 29. For the reasons discussed *supra* §§ III.A.2.b and III.A.2.e, we find that the ChloraPrep PAR discloses a “sterilized chlorhexidine gluconate composition comprising chlorhexidine gluconate and alcohol.”

*d) “an applicator for facilitating application of the sterilized chlorhexidine”*

Claim 12 recites “an applicator for facilitating application of the sterilized chlorhexidine.” Ex. 1001, 28:21–22. This limitation overlaps with the limitations of claim 1 discussed *supra* §§ III.A.2.a and III.A.2.c. Petitioner relies on the same proof discussed in those sections and Patent Owner relies on the same arguments in opposition. Pet. 37; PO Resp. 30. For the reasons discussed *supra* §§ III.A.2.a and III.A.2.c, we find that the ChloraPrep PAR discloses a “an applicator for facilitating application of the sterilized chlorhexidine.”

*e) “a receptacle containing the sterilized chlorhexidine gluconate composition”*

Claim 12 recites “a receptacle containing the sterilized chlorhexidine gluconate composition.” Ex. 1001, 28:23–24. This limitation overlaps with the limitations of claim 1 discussed *supra* §§ III.A.2.a and III.A.2.d. Petitioner relies on the same proof discussed in those sections and Patent Owner relies on the same arguments in opposition. Pet. 37; PO Resp. 30. For the reasons discussed *supra* §§ III.A.2.a and III.A.2.d, we find that the ChloraPrep PAR discloses a “an applicator for facilitating application of the sterilized chlorhexidine.”

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*f) “compromising the receptacle to provide the sterilized chlorhexidine gluconate composition to impregnate the applicator”*

Claim 12 recites the step of “compromising the receptacle to provide the sterilized chlorhexidine gluconate composition to impregnate the applicator.” Ex. 1001, 28:25–27. Petitioner contends that the ChloraPrep PAR discloses this step because it “instructs users to ‘remove the applicator from the wrapper,’ at which point ‘[t]he applicator is squeezed gently to break the ampoule containing the antiseptic solution, which is released into the sponge in a controlled flow.’” Pet. 37–38 (citing Ex. 1005, 5).

Patent Owner argues that the ChloraPrep PAR does not disclose this limitation “because no sterilized CHG composition is disclosed.” PO Resp. 30. We do not agree with this argument for the reasons discussed *supra* §§ III.A.2.b. Patent Owner also argues that the ChloraPrep PAR does not disclose this limitation “there is no description of how a receptacle is configured ‘to provide the sterilized [CHG] composition to impregnate the applicator.’” *Id.* We do not agree with this argument for the reasons discussed *supra* §§ III.A.2.d.

*g) “applying the sterilized chlorhexidine gluconate composition to a patient’s skin”*

Claim 12 recites the step of “applying the sterilized chlorhexidine gluconate composition to a patient’s skin.” Ex. 1001, 28:28–29. Petitioner contends that the ChloraPrep PAR discloses this step because it “teaches the steps for using the product for topical disinfection, including squeezing the applicator [to] ‘break the ampoule containing the antiseptic solution’ which is released into a sponge which ‘is gently pressed against the patient’s skin in order to apply the antiseptic solution.’” Pet. 38–39 (citing Ex. 1005, 5, 9).

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Patent Owner relies on the same arguments it made with respect to the limitation discussed *supra* § III.A.3.f. PO Resp. 36. We find that the ChloraPrep PAR discloses this limitation. Ex. 1005, 5, 9. We do not agree with Patent Owner’s arguments for the reasons discussed *supra* § III.A.3.f.

#### 4. *Claims 2 and 13*

Claim 2 depends from claim 1 and additionally requires that “the receptacle contains the sterilized chlorhexidine gluconate composition in an amount between 0.1 and 100 mL.” Ex. 1001, 27:36–39. Claim 13 depends from claim 12 and additionally requires that “the applicator is impregnated with 0.1 to 100 mL of the sterilized chlorhexidine gluconate composition.” *Id.* at 28:30–34. Petitioner contends that the ChloraPrep PAR discloses these limitations because it teaches three amounts falling within claimed range, 3 ml, 10.5 ml, and 26 ml. Pet. 39.

Patent Owner argues that the ChloraPrep PAR does not disclose these limitations “[b]ecause the PAR fails to disclose the sterilized CHG composition.” PO Resp. 31. We do not agree with this argument for the reasons discussed *supra* §§ III.A.2.b.

Patent Owner also argues: “Petitioner does not explain how the PAR discloses the distinct requirement of Claim 13 that ‘when the receptacle is compromised, the applicator is impregnated with 0.1 to 100 mL of the sterilized [CHG] composition.’” PO Resp. 31. Patent Owner cites to the testimony of Dr. Rutala who contends that Dr. Dabbah “addresses the volume of CHG solution in the device,” but does not explain how recited volume of sterilized CHG impregnates the applicator when the receptacle is compromised. Ex. 2023 ¶ 254. We do not agree with this argument.

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Petitioner explains that, “[t]he *ChloraPrep PAR* . . . teaches that when the receptacle is compromised, the antiseptic CHG solution is ‘released onto the sponge in a controlled flow,’ thus impregnating the applicator with 0.1 to 100 mL of the sterilized chlorhexidine gluconate composition.” *Id.* at 40 (citing Ex. 1005, 5). This is sufficient. Given the broad range recited in the claims, which extends to as little as 0.1 mL, and the comparatively large amounts exemplified in the *ChloraPrep PAR*, which may be as large as 26 mL, it not plausible that the amount of CHG solution that would be “released onto the sponge in a controlled flow” when the ampule is broken (Ex. 1005, 5) would fail to fall within the recited range. Accordingly, we find that the *ChloraPrep PAR* discloses impregnating the applicator with 0.1 to 100 mL of sterilized CHG when the receptacle is compromised.

#### 5. *Claims 3 and 14*

Claim 3 depends from claim 1 and additionally recites that the CHG composition comprises a specific amount of chlorhexidine gluconate (“from 1.5 to 5.0 wt. % based on the total weight of said sterilized antiseptic composition”) and a specific amount of alcohol (“50 wt. % based on the total weight of the sterilized antiseptic composition”). Claim 14 depends from claim 12 and recites the same amounts of chlorhexidine gluconate and alcohol as are recited in claim 3. Petitioner contends that the *ChloraPrep PAR* discloses a CHG composition in which the amount of chlorhexidine gluconate and the amount of alcohol fall within the claimed ranges. Pet. 41.

Patent Owner does not dispute that the amounts of chlorhexidine gluconate and alcohol disclosed in the *ChloraPrep PAR* fall within the claimed ranges, but repeats its argument that the composition is not sterilized and thus does not meet the additional limitations of claims 3



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and 14. PO Resp. 31. We do not agree with this argument for the reasons discussed *supra* §§ III.A.2.b. We find that the ChloraPrep PAR discloses a composition meeting the additional limitations of claims 3 and 14 for the reasons set forth in the Petition. *See* Pet. 41–43.

*6. Claims 5 and 15*

Claim 5 depends from claim 1 and additionally recites that the alcohol in the sterilized CHG composition is isopropyl alcohol. Claim 15 depends from claim 12 and also additionally recites that the alcohol is isopropyl alcohol. Petitioner contends that the ChloraPrep PAR discloses a CHG composition where the alcohol is isopropyl alcohol. Pet. 43–44.

Patent Owner does not dispute that CHG composition disclosed in the ChloraPrep PAR comprises isopropyl alcohol, but repeats its argument that the composition is not sterilized and thus does not meet the additional limitations of claims 3 and 14. PO Resp. 31. We do not agree with this argument for the reasons discussed *supra* §§ III.A.2.b. We find that the ChloraPrep PAR discloses a composition meeting the additional limitations of claims 5 and 15 for the reasons set forth in the Petition. *See* Pet. 43–44.

*7. Claims 6 and 16*

Claim 6 depends from claim 1 and additionally recites that the sterilized CHG composition comprises water. Claim 16 depends from claim 12 and also additionally recites that the sterilized CHG composition comprises water. Petitioner contends that the ChloraPrep PAR discloses a CHG composition where “purified water” is listed as an excipient and as an “inactive ingredient. Pet. 44.

Patent Owner does not dispute that CHG composition disclosed in the ChloraPrep PAR comprises water, but repeats its argument that the

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composition is not sterilized and thus does not meet the additional limitations of claims 3 and 14. PO Resp. 32. We do not agree with this argument for the reasons discussed *supra* §§ III.A.2.b. We find that the ChloraPrep PAR discloses a composition meeting the additional limitations of claims 6 and 16 for the reasons set forth in the Petition. *See* Pet. 44.

8. *Claims 7, 8, 17, and 18*

Claims 7 and 17 recite that “the sterilized chlorhexidine gluconate composition [of claim 1/12] further comprises one or more additives selected from the group consisting of [seven “sterilized” additives including] a sterilized colorant.” Claims 8 and 18 depend from claims 7 and 17 and further recite that “the additive is a colorant.” Petitioner contends that the ChloraPrep PAR meets the additional limitations of claims 7, 8, 17, and 18 because it discloses an “Orange Solution” which uses the excipient “Sunset Yellow E110).” Petitioner argues that “[a]s an excipient included within the sterilized chlorhexidine gluconate solution, that colorant is similarly sterile and sterilized.” Pet. 50; *see* Ex. 1003 ¶ 127.

Patent Owner argues that “Petitioner identifies nothing in the PAR that states the tint is in the ‘alcoholic antiseptic solution’” and “the PAR does not disclose[] that the ‘tint’ is sterile – much less sterilized.” PO Resp. 32, 33. In addition, Patent Owner points to Chiang as teaching that the “dye is separate from the solution.” *Id.* And in its Sur-reply, Patent Owner cites the testimony of Mr. Noble-Clark to support that “the dye is not in the solution but in the applicator head.” Sur-reply 17 (citing Ex. 2044, 64:5–65:19).

The evidence of record supports that the dye in the product described in the ChloraPrep PAR is not initially stored in the reservoir with the CHG

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composition. The ChloraPrep PAR states that its applicators “consist of a latex-free sponge attached to a plastic handle/barrel which holds a latex-free dyed pledget and glass ampoule containing the antiseptic solution.”

Ex. 1005, 7. Thus, the applicator includes both a sponge and a pledget. A pledget is a device positioned “between the glass ampoule and the sponge.”

Ex. 2044, 64:10–65:12. According to Mr. Noble-Clarke, “when you . . . break the ampoule, the solution runs through the pledget picking up the dye so that what the sponge in fact dispenses onto the patient becomes a tinted rather than a clear chlorhexidine.” Ex. 2044, 65:5–8. Mr. Noble-Clarke’s testimony that solution picks up the dye when it runs through the pledget is consistent with the repeated description of a “dyed pledget” in the ChloraPrep PAR. Ex. 1005, 7, 10, 18. It also is consistent with Chiang, which teaches that “the ChloraPrep® applicators have the CHG composition in a glass ampule and the dye composition is provided in the foam applicator head.” Ex. 2015 ¶ 13.

Although the dye in the ChloraPrep PAR product is initially in the pledget rather than the ampule as part of the CHG solution, the ChloraPrep PAR still identifies the dye as an “excipient.” *Id.* at 7 (identifying “[p]urified water” and “Sunset Yellow (E110)” as excipients), 17 (“Other ingredients consist of excipients, namely sunset yellow (E110) and purified water.”). An excipient is “an inactive ingredient in the composition” and is “essentially the medium in some way for the active substance.” Ex. 1040, 234:15–239:7 (testimony of Dr. Rutala).

In order to reconcile the evidence that Sunset Yellow is in the pledget with the evidence that it is an “excipient,” we find that Sunset Yellow must become an excipient when CHG solution passes through the

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pledget. This explanation is consistent with the explanation Patent Owner's counsel provided at oral argument:

Now you asked earlier about an excipient. It [the dye] is an excipient. It's an excipient in the barrel or handle. But there's nothing that requires it to be in the solution. And it is also an excipient when it's finally applied onto the patient when it, in fact, becomes an orange solution. But in terms of what's disclosed as sterile, there's no indication that that pledget was ever sterile.

Tr. 61. In sum, regardless of when the Sunset Yellow (E110) enters into solution with the remainder of the CHG solution, it is still considered an excipient.

The identification of the dye in the ChloraPrep PAR as an excipient supports that it is sterile. In his deposition, Dr. Rutala explained:

Q: . . . For -- for a composition to be considered sterile, the excipients have to be sterile, too, right?

A: If you're -- only want a definition of the word "sterile," the excipients would have to be sterile and devoid of microbial contamination.

Ex. 1040, 238:20–239:7; *see generally* 234:15–239:7. This testimony is consistent with that of Dr. Dabbah, who testifies: “[a]s an excipient included within the sterilized chlorhexidine gluconate solution, that colorant [Sunset Yellow] is similarly sterile and sterilized.” Ex. 1003 ¶ 127. Dr. Dabbah further testifies that “approval of ChloraPrep’s description as a sterile composition in the ChloraPrep PAR, requires the sterilization of all substances in the solution.” *Id.*

Accordingly, we find that the colorant disclosed in the ChloraPrep PAR is sterile. This finding is additionally supported by the statement in the ChloraPrep PAR that “ChloraPrep *with Tint* is a sterile alcoholic antiseptic

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solution.” Ex. 1005, 7. In this statement, the word “sterile” modifies the whole term “ChloraPrep with Tint.”

For the reasons discussed above, we find that ChloraPrep PAR discloses the additional limitations recited in claims 7, 8, 17, and 18.

*9. Claims 10 and 20*

Claims 10 and 20 depend from claims 1 and 12 and further recites that the sterilized chlorhexidine article “has a sterility assurance level of from  $10^{-3}$  to  $10^{-9}$ .” Petitioner contends that because the ChloraPrep PAR is a UK regulatory document, a person of ordinary skill in the art would have understood that “when the ChloraPrep PAR describes the product and its components as ‘sterile,’ it is directly and necessarily referring to a sterility assurance level within the range from  $10^{-3}$  to  $10^{-9}$  – specifically  $10^{-6}$ .” Pet. 46–47. More specifically, Petitioner contends that the regulations applicable to medical devices require that “to describe the medical device and its components as ‘sterile,’ they must have a sterility assurance level of  $10^{-6}$ .” *Id.* at 47 (citing BS EN 556-1).

In response Patent Owner repeats its argument that Petitioner has not established that the entire product or article disclosed in the ChloraPrep PAR has been sterilized. PO Resp. 34. We do not agree with this argument for the reasons discussed *supra* § III.A.2.a.

Patent Owner also makes several arguments as to why BS EN 556-1 does not apply to the ChloraPrep PAR. We discussed these arguments *supra* § III.A.2.a, and do not agree with them for the reasons discussed therein. In that section, which we incorporate herein, we found that a person of ordinary skill in the art would have understood BS EN 556-1 to apply to the product disclosed in the ChloraPrep PAR. BS EN 556–1 requires a sterility

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assurance level of  $10^{-6}$ . Ex. 1017, 8. In addition, Dr. Rutala testified that a SAL of  $10^{-6}$  is the common, widely accepted standard for designating a component or device as “sterile.” *See* Ex. 1040, 235:16–237:22. For these reasons, we find that a person of ordinary skill in the art would have understood the product disclosed in the ChloraPrep PAR to have a sterility assurance level of  $10^{-6}$ , thus meeting the sterility assurance level requirement recited in claims 10 and 20.

#### *10. Claim 11*

Claim 11 depends from claim 1 and further recites that the applicator comprises a foam. Petitioner contends that the ChloraPrep PAR discloses this additional limitation by disclosing that the applicator includes a sponge. Pet. 49–51 (citing Ex. 1005, 5). Petitioner cites the testimony of Dr. Dabbah, who testifies that “[a] POSA would recognize . . . that a sponge is a foam.” Ex. 1003 ¶ 137 (cited at Pet. 51); *see also* Ex. 1001, 7:14–22 (disclosing that “the foam may comprise an open-celled foam”).

Patent Owner does not dispute that the ChloraPrep PAR discloses that the applicator comprises a foam, arguing only that Petitioner has not established anticipation of independent claim 1. We do not agree with this argument for the reasons discussed *supra* §§ III.A.2. We find that the ChloraPrep PAR discloses a composition meeting the additional limitations of claim 11 for the reasons set forth in the Petition. *See* Pet. 49–51.

#### *11. Enablement of the ChloraPrep PAR*

“[A] prior art reference cannot anticipate a claimed invention ‘if the allegedly anticipatory disclosures cited as prior art are not enabled.’” *In re Antor Media Corp.*, 689 F.3d 1282, 1289 (Fed. Cir. 2012). “Enablement requires that the prior art reference must teach one of ordinary skill in the art

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to make or carry out the claimed invention without undue experimentation.”  
*Elan Pharm., Inc. v. Mayo Found.*, 346 F.3d 1051, 1054 (Fed. Cir. 2003).

Patent Owner argues: “Petitioner does not establish that the PAR enables a POSA to make the claimed sterilized product/article, sterilized CHG composition, or sterilized additives.” PO Resp. 36–37. According to Patent Owner, “[t]he PAR provides no information regarding sterilization of any products or their components, mentions no sterilization processes whatsoever (much less validated ones), and does not describe how to achieve the claimed SALs with any validated sterilization processes.” *Id.* at 37. Patent Owner points to “numerous challenges existing at the time regarding making sterilized chlorhexidine” and argues that “Petitioner offers no explanation how other prior art enables a POSA to make the claimed sterilized CHG composition . . . when the PAR itself does not suggest sterilization whatsoever.” *Id.* at 37–38. Finally, Patent Owner argues that Petitioner’s assertions of enablement are “belied by its own admissions” that it “‘overcame the ‘impossible’ when it released a fully sterilized ChloroPrep product, which, according to Petitioner, required ‘6 years,’ ‘Millions of dollars,’ and ‘>50,000 R&D hours.’” *Id.* at 38 (citing Ex. 2007, 15, 17).

As an initial matter, it is Patent Owner’s burden to demonstrate that the ChloroPrep PAR is not enabled. *Sasse*, 629 F.2d 675; *Antor Media Corp.*, 689 F.3d 1282; *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1355 n.22 (Fed. Cir. 2003). Patent Owner has not carried its burden to do so.

The evidence supports Petitioner’s assertion that “sterilization of the applicator, via, for instance ETO was a well-known and routine process.” Pet. 52; Ex. 1003 (unrebutted testimony of Dr. Dabbah that a person of

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ordinary skill in the art would be very familiar with terminal sterilization processes, such as using ETO, and would consider them routine); Ex. 2015 (Chiang teaching that ChloroPrep was sterilized using ethylene oxide); *see also* Ex. 1040, 141:18–147:21 (Dr. Rutala testimony discussing sterilization using ETO).

The evidence also supports that a person of ordinary skill in the art would have been able to sterilize CHG based on the disclosure of the ChloroPrep PAR and what was known in the art without undue experimentation. As discussed *supra* § III.A.2.b, Degala describes a prior art sterilization process for CHG. Ex. 1007 ¶ 2 (“A known antiseptic solution containing [CHG] . . . is sterilized for EU countries *using a known sterilization method.*”). In addition, Degala discloses an allegedly improved sterilization process that addresses the “need in the art” for a sterilizing process with a “shorter, more efficient processing time.” *Id.* ¶¶ 5–7.

We recognize the evidence identified by Patent Owner regarding the challenges of developing sterilized CHG. Ex. 2007, 15, 17. In the absence of a disclosed method for sterilizing CHG, these concerns might be persuasive. But here, methods for sterilizing CHG were known and disclosed in the Degala patent.<sup>13</sup> *United States v. Telectronics, Inc.*, 857

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<sup>13</sup> Based on what was known in the art, the challenges reflected in Petitioner’s purported admission appear to relate not to sterilizing CHG, but to finding a “shorter, more efficient” method for doing so. *See* Ex. 1007 ¶¶ 3, 5 (describing a “known method of sterilization” that occurs over 24–31 hours and identifying an “unmet need in the art for a method . . . that has a shorter, more efficient processing time”). Moreover, the disclosure that Patent Owner cites to support that it took Petitioner six years and millions of dollars to develop a sterilization method itself cited Degala, suggesting that the method that took such effort to develop may, in fact, be the method



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F.2d 778, 785, 8 USPQ2d 1217, 1223 (Fed. Cir. 1988) (“The test of enablement is whether one reasonably skilled in the art could make or use the invention from the disclosures in the patent coupled with information known in the art without undue experimentation.”).

Considering all of the evidence of record, the purported deficiencies in the ChloroPrep PAR’s disclosure identified by Patent Owner, and the evidence that Petitioner expended considerable effort in developing a method of sterilizing CHG, do not overcome the presumption that the ChloroPrep PAR is enabled. This is particularly true given the knowledge in the art regarding terminal sterilization and sterilization of CHG.

*B. Alleged Obviousness of Claims 1–3, 5–8, 10–18, and 20 in View of ChloroPrep PAR*

Petitioner contends claims 1–3, 5–8, 10–18, and 20 would have been obvious to a person of ordinary skill in the art at the time of the invention, in view of ChloroPrep PAR and relies on the same arguments asserted in its anticipation challenge, plus the assertion that if certain of the limitations recited in the challenged claims are not anticipated, they would have been obvious. Pet. 52–56. Patent Owner disagrees, arguing, *inter alia*, that the reference does not teach or suggest “a sterilized chlorhexidine gluconate composition” because “Petitioner’s vague reference to unidentified standards and guidelines” does not “transform[] the word ‘sterile’ to a requirement that the ChloroPrep product and its components ‘must’ be ‘subjected to validated sterility processing.’” PO Resp. 40 (citing Pet. 52), *see generally id.* at 40–

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disclosed in Degala. Ex. 2007, 16 n.1; Ex. 1007 code (71) (Degala, identifying “CAREFUSION 2200, INC” as the applicant).

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47. For the reasons that follow, we determine Petitioner has shown by a preponderance of the evidence that the challenged claims would have been obvious to a person of ordinary skill in the art at the time of the alleged invention in view of the ChloraPrep PAR under 35 U.S.C. § 103.

*1. Analysis of Challenged Claims 1–3, 5–8, 10–18 and 20*

As discussed above, Petitioner has demonstrated sufficiently that ChloraPrep PAR discloses all elements of the challenged claims. We find that Petitioner’s arguments that the ChloraPrep PAR renders obvious “a sterilized chlorhexidine product” and “a sterilized chlorhexidine gluconate composition” provide an additional basis on which the challenged claims are unpatentable.<sup>14</sup>

In addition to the evidence introduced as part of its anticipation ground, Petitioner contends that to the extent “the disclosures referring to the antiseptic solution containing CHG, the applicator[,] or the ChloraPrep with Tint product as ‘sterile’ do not disclose that the elements (or product/article) have been ‘sterilized,’” it would have been obvious to a person of ordinary skill in the art at the time of the invention that “a product described as ‘sterile’ in a regulatory document such as a PAR must have each component subjected to validated sterility processing that renders the product free of viable microorganisms.” Pet. 53. Petitioner also asserts that to the extent the ChloraPrep PAR does not disclose the SAL recited in claim 10 and 20, it

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<sup>14</sup> As noted above, we do not determine whether the preambles of claims 1 and 12 are limiting because, regardless of whether the preamble is limiting, Petitioner has shown that the recitation in the preamble is satisfied by the prior art.

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would have been obvious “to sterilize the components of the product described as ‘sterile’ in the *ChloraPrep PAR* within the required SAL range in order to comply with the relevant standards,” for the reasons discussed in connection with its anticipation argument.

Petitioner bases its obviousness position largely on the requirements in the relevant UK standards published as regulatory document, EN 556-1. *Id.* (citing Ex. 1003 ¶ 144); Tr. 11:7–9, 23:24–25:25, 28:6–25; *see also* Reply 12–13 (anticipation argument citing Ex. 1048–1049; Ex. 1037 ¶¶ 4–6; Ex. 1038 ¶¶ 6–17). According to Petitioner, “[i]f any component or subcomponent of the product had not been subjected to such a process, the entire product or solution could not be described as ‘sterile’ as it would contaminate the larger whole.” Pet. 53. Petitioner further argues that per the UK standard, EN 556-1, “each component must be sterilized to a SAL of  $10^{-6}$ .” Reply 13 (citing Ex. 1017, 8 in connection with anticipation ground).

Petitioner relies on the testimony of its declarant, Dr. Dabbah, to support its position. Pet. 53–54. Dr. Dabbah testifies that a sterility assurance level (“SAL”) of “ $10^{-3}$  is a well-established baseline for products,” and “a SAL of  $10^{-6}$  is a well-established and universally recognized requirement for describing a product—as is done in the *ChloraPrep PAR*—as ‘sterile.’” Ex. 1003 ¶ 145 (testimony relating to SAL recited in claims 10 and 20) citing Ex. 1017, 8, 13); *see also, id.* ¶ 144 (testimony on claims 1 and 12). Dr. Dabbah further testifies “it would have been obvious to a POSA to sterilize the components of the product described in the *ChloraPrep PAR* within the required range. Indeed, a POSA would have considered this to be the only way to describe the device and composition

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a[s] ‘sterile’ in a UK regulatory document.” *Id.*; *see also* Ex. 1037 ¶ 4 (testimony of Mr. Noble-Clarke regarding application of BS EN556-1 to ChloroPrep UK products); Ex. 1045 (email from Mr. Noble-Clarke regarding same). Petitioner argues that although “not applicable to a UK medical device, the relevant FDA guidelines for a device labeled as ‘sterile’ are practically identical to the UK standard, and were issued in draft form on December 12, 2008 and issued on January 21, 2016.” Pet. 54–55 (citing Ex. 1028). According to Petitioner, under the section “Sterilization Information for Devices Labeled as Sterile,” the FDA guidelines provide that “[t]he sponsor should state the sterility assurance level (SAL) of  $10^{-6}$  for devices labeled as sterile unless the device is intended only for contact with intact skin. FDA recommends a SAL of  $10^{-3}$  for devices intended only for contact with intact skin.” *Id.* at 55 (citing Ex. 1028, 8–9) (alteration in original). Petitioner concludes that “even if Patent Owner contends that ‘sterile’ does not necessarily refer to the claimed SAL, it would have been obvious to a POSA to sterilize the claimed components to the required SAL.” Pet. 56.

Patent Owner contends that Petitioner’s obviousness challenge is conclusory and fails for a number of reasons. PO Resp. 39–40. **First**, Patent Owner argues that Petitioner cannot establish the existence of missing limitations with “conclusory assertion[s]. . . about general knowledge in the art without evidence on the record, particularly where it is an important structural limitation that is not evidently and indisputably within the common knowledge of those skilled in the art.” *Id.* at 40 (citing *K/S Himpp v. Hear-Wear Techs., LLC*, 751 F.3d 1362, 1365-66 (Fed. Cir. 2014); *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1362 (Fed. Cir. 2016)).”

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**Second**, Patent Owner contends Petitioner has not established “that the bare use of the word ‘sterile’ in 2010 in ChloraPrep PAR means that any chlorhexidine gluconate composition had been sterilized.” *Id.* Patent Owner asserts that “Petitioner’s vague reference to unidentified ‘standards and guidelines’” does not establish obviousness or the requisite knowledge in the art. *Id.* (citing Pet. 52; Ex. 2023 ¶¶ 325–329). According to Patent Owner, “[t]here is no evidence that any ‘standard and guideline’ transforms the word ‘sterile’ to a requirement that the ChloraPrep product and its components ‘must’ be ‘subjected to validated sterility processing.’” *Id.* (citing Ex. 2023 ¶¶ 327–328). Patent Owner further argues that Petitioner’s “failure of proof is problematic given the ‘difficulty’ and ‘impossibility’ at that time, the numerous outbreaks from contaminated antiseptics, and the nascent state of the art.” *Id.* at 41.

**Third**, Patent Owner contends that Petitioner’s position is undermined by “the FDA’s guidance that advised manufacturers to clarify their labelling, coupled with CareFusion’s 2015 reported label change to indicate that its solution was ‘not sterilized’ (despite including the word ‘sterile’ on its label).” *Id.* at 41 (citing Exs. 2005–2006; Ex. 2009, 26, 34, 43, 50, 57; Ex. 2023 ¶¶ 330–332).

**Fourth**, Patent Owner contends that, “even if unidentified ‘standards’ compelled a POSA to translate ‘sterile’ to ‘sterilized,’ Petitioner does not explain how that would further compel a POSA to understand that the product, article, or composition would have been subjected to validated sterility processing.” *Id.* (citing Ex. 2023 ¶ 333).

**Fifth**, Patent Owner argues that our Institution Decision cites references (i.e., Degala, Margoosian, or Scholz) that were not explicitly

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presented in the obviousness challenge in the Petition, and that these references should be ignored. *Id.* at 42; Sur-Reply 18–19. Patent Owner states that the obviousness arguments in the Petition “focus solely on regulatory ‘standards’ – not knowledge based on the prior art references,” and therefore, Petitioner should be limited to only what is in the Petition. PO Resp. 42–43. Even relying on these references, Patent Owner asserts, Petitioner cannot establish obviousness. *Id.* at 43 (citing Ex. 2023 ¶¶ 346–347). According to Patent Owner, “***Scholz*** reflects the then-existing misconception that antiseptics need not be sterilized and describes no methods for sterilizing CHG compositions but mentions sterilizing packaging.” *Id.* at 44. Patent Owner asserts that “Petitioner’s own testing of Margoosian established that Margoosian ‘results in a solution that is not sterile’—despite suggesting the contrary in 2015.” *Id.* As to Degala, Patent Owner asserts that it “documents the ongoing uncertainty regarding existing sterilization methods and describes neither a sterilized product or article or any validated sterility processing.” *Id.*

**Finally**, Patent Owner asserts that the field was nascent and none of the cited references describe a CHG composition “subjected to a suitable sterilization process such that sterility can be validated.” PO Resp. 44 (citing Ex. 2023 ¶¶ 104, 310, 412); Sur-Reply 20.

For the reasons discussed *supra* § III.A, we find that Petitioner has established, by a preponderance of the evidence, that a person of skill in the art would have understood the use of the word “sterile” in 2010 in ChloroPrep PAR to mean that the things labeled “sterile” – i.e., “ChloroPrep with Tint,” the “sterilized alcoholic antiseptic solution,” and the “applicators” – had been sterilized, as required by the challenged claims. In

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addition, Petitioner has established by a preponderance of the evidence that it would have been obvious to one of skill in the ordinary art at the time of the invention to sterilize the things labeled “sterile” in the ChloraPrep PAR.

Specifically, as discussed *supra* §§ III.A.2.a. and III.A.2.b, Petitioner has shown that “some degree of sterilization [was] required in European Union (EU) countries” (*see* Ex. 1007 ¶ 2) and that its ChloraPrep products sold within the United Kingdom (UK) were subject to UK regulatory requirements as outlined in EN 556-1. *See* Ex. 1003 ¶ 144; Ex. 1017; Ex. 1037 ¶¶ 1–12; Ex. 1038 ¶¶ 6–16. The EN 556-1 standard states that a product can be designated as “sterile” only if it had undergone a validated sterilization process. *See* Ex. 1017, 6. Moreover, as discussed *supra* §§ III.A.2.a and III.A.2.b, the evidence supports that a person of ordinary skill in the art would have been aware of the standards for calling a product “sterile” in a regulatory document and thus motivated to follow them. Ex. 1003 ¶¶ 71, 91, 129–134, 144–145; Ex. 1017; *see also*, Ex. 1040, 199:24–200:18 (Dr. Rutala testimony that “I would agree that it’s likely that a POSA would be aware of ISO standards. And likely, they would be aware of the ISO standards for steam sterilization or moist heat as well as ethylene oxide, dry heat.”).

Additionally, the testimony of Dr. Dabbah establishes that it was within the knowledge of one of ordinary skill in the art at the time of the invention (i.e., Nov. 25, 2015) to sterilize the chlorhexidine gluconate composition individually in the ChloraPrep product using techniques such as that disclosed by Degala in July 2015. *See* Ex. 1003 ¶ 76; Ex. 1007 ¶¶ 2–4, 7, 28, 30, 50. We credit the testimony of Dr. Dabbah that prior art references such as Degala (Ex. 1007) are indicative of the level of skill and

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the knowledge possessed by an ordinary artisan at the relevant time. *See* Ex. 1003 ¶¶ 73–75; *Standard Oil Co. v. Am. Cyanamid Co.*, 774 F.2d 448, 454 (Fed. Cir. 1985) (“The issue of obviousness is determined entirely with reference to a hypothetical ‘person having ordinary skill in the art.’ It is only that hypothetical person who is presumed to be aware of all the pertinent prior art.”).

Furthermore, given the disclosures of Degala (Ex. 1007), we do not agree with Patent Owner that the field of chlorhexidine gluconate sterilization was a nascent field. Rather, Degala explicitly states that CHG can be sterilized using a “known method” and presents an improvement on that method. Ex. 1007 ¶¶ 3, 7. Degala also discloses the results of testing to determine how long it took to reach a SAL of  $10^{-6}$  for a CHG solution sterilized at three different temperatures. *Id.* ¶ 52. Thus, Degala supports our finding that CHG sterilization was a developed field. Although not necessary to this determination, we note that for the reasons discussed *supra* § III.A.2.b, Scholz also supports that it was known that CHG could be sterilized using “a variety of industry standard techniques.” Ex. 1008 ¶ 178.<sup>15</sup>

For the reasons discussed *supra* § III.A.2.a, the evidence also supports that a person of ordinary skill in the art would have known how to terminally sterilize the product disclosed in the ChloroPrep PAR and would have considered it routine to do so. *See, in particular, discussion of* Ex. 1003 ¶ 138; Ex. 2015 ¶ 10; Ex. 1040, 141:18–143:6, 145:2–147:21 190:6–20; Ex.

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<sup>15</sup> As the record already includes ample support for our finding that a person of ordinary skill in the art would have known how to sterilize CHG, we need not determine here whether Margoosian further supports this finding.



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2023 ¶ 206; *see also*, Ex. 1003 ¶ 71 (discussed *supra* § III.A.2.b).

Accordingly, we find that a person of ordinary skill in the art would have known how to sterilize the entire product described in the ChloraPrep PAR.

The evidence of record also supports that a person of ordinary skill in the art would have had a reasonable expectation of success. As discussed *supra* § III.A.2.b, the record supports that a person of ordinary skill in the art would have known of the existence of a product containing sterilized CGH. *See, in particular, discussion of* Ex. 1005, Ex. 1007 ¶ 2; Ex. 1044, 41; Ex. 1037 ¶¶ 2, 7; Ex. 1038 ¶¶ 3, 4, 6, 10. In addition, the record supports that a person of ordinary skill in the art would have known of the existence of terminally sterilized CHG products. For example, as discussed *supra* § III.A.2.a, Chiang discloses terminal sterilization of CareFusion’s ChloraPrep applicator using ethylene oxide. Ex. 2015 ¶ 10. The knowledge of terminally sterilized products and products with sterilized CHG solutions, coupled with the knowledge of methods of sterilizing, supports that a person of ordinary skill in the art would have had a reasonable expectation of success in sterilizing all of the things labeled “sterile” in the ChloraPrep PAR.

In sum, we find that given the UK regulatory requirements, a person of ordinary skill in the art would have been motivated to “sterilize” the things described in the ChloraPrep PAR as “sterile” – i.e., the “alcoholic antiseptic solution,” the “applicator,” and the “ChloraPrep with Tint” product itself. Ex. 1003 ¶¶ 144–145. We also find that a person of ordinary skill in the art would have known how to sterilize each of the things described in the ChloraPrep PAR as “sterile” to the SAL recited in claims 10

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and 20, and that a person of ordinary skill in the art would reasonably have expected success in doing so.

We turn now to Patent Owner's arguments. **First**, we are not persuaded by Patent Owner's arguments that Petitioner has not established that it would have been obvious to sterilize CHG because Petitioner relies on "conclusory assertion[s] . . . about general knowledge in the art without evidence on the record." Petitioner and its expert, Dr. Dabbah, provided more than mere conclusory assertions about the general knowledge in the art at the critical time. The circumstances here are distinguishable from *K/S Himpp*, because here, to the extent the ChloroPrep PAR does not disclose a sterilized product with a sterilized CHG solution, it includes an explicit suggestion that they should be "sterile." *See, e.g.*, Ex. 1005, 7.

Furthermore, the record here is not limited to "general knowledge," but includes specific teachings of products having sterilized CHG and terminally sterilized products having CHG compositions.

**Second**, Patent Owner's argument that Petitioner's obviousness challenge fails because it relies on "vague reference to unidentified 'standards and guidelines,'" is also unpersuasive. The evidence of record includes specific standards and guidelines, including BS EN 556-1 and corresponding FDA guidelines. *See* Ex. 1017; Ex. 1028. In addition, Dr. Rutala confirmed that a SAL of  $10^{-6}$  is the common, widely accepted standard for designating a component or device as "sterile." *See* Ex. 1040, 235:16–237:22; *see* Ex. 1013 (ISO 11137-1 International Standard for "Sterilization of health care products—Radiation"), 13.

**Third**, Patent Owner's arguments regarding the FDA's guidance and CareFusion's 2015 label change are irrelevant, because Petitioner's

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obviousness arguments are premised on (1) a ChloroPrep regulatory document relating to a product sold within the United Kingdom and (2) the knowledge of those of ordinary skill in the art as demonstrated by evidence found in EN 556-1 (Ex. 1017), Degala (Ex. 1007), and Scholz (Ex. 1008).

**Fourth**, we do not agree with Patent Owner’s argument that Petitioner does not explain how the evidence of record would further compel a person of ordinary skill in the art to understand that the product, article, or composition would have been subjected to validated sterility processing. We do not understand Petitioner to argue that it would have been obvious that the product described in the ChloroPrep PAR had been sterilized. Rather, Petitioner argues that, to the extent the product described in the ChloroPrep PAR is found not to be sterilized, it would have been obvious to sterilize it. Pet. 56 (“Thus, even if Patent Owner contends that ‘sterile’ does not necessarily refer to the claimed SAL, it would have been obvious to a POSA to sterilize the claimed components to the required SAL.”).

**Fifth**, we do not agree with Patent Owner’s arguments that Petitioner’s evidence regarding the Degala, Margoosian, and Scholz references should be ignored because these references are not argued explicitly in the Petition as part of Petitioner’s first obviousness challenge. *See* PO Resp. 42; Sur-Reply 18–19. Petitioner’s challenge asserts that its ChloroPrep product was sold within the United Kingdom and person of ordinary skill in the art at that time would have known the composition was sterilized as demonstrated by evidence found in EN 556-1 (Pet. 52; Ex. 1003 ¶ 144 (citing Ex. 1017)). Degala (Ex. 1007) is part of the basis for Petitioner’s second obviousness challenge, but it explicitly references regulatory standards in the EU, which supports Petitioner’s arguments

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regarding EN 556-1. Petitioner explains this in its at Reply, which is appropriate rebuttal argument. Reply 8, 23. Additionally, “a person of ordinary skill in the art is a hypothetical person who is presumed to know the relevant prior art.” *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). Moreover, we do not agree with Patent Owner’s characterization of Degala and Scholz. *See* PO Resp. 43. As discussed above, Degala and Scholz support that the person of ordinary skill in the art would have known how to sterilize CHG compositions.

**Finally**, as discussed *supra* § III.A.2.a, applicable standards required a specific SAL and Dr. Rutala conceded that “you have to have a validated sterility process to have a sterility assurance level.” Ex. 1043, 159:20–25. Accordingly, we are not persuaded by Patent Owner’s argument that none of the cited references describe a CHG composition “subjected to a suitable sterilization process such that sterility can be validated.” PO Resp. 44. For these reasons, we find that all the limitations of claims 1–3, 5–8, 10–18 and 20 were taught or suggested at the critical time in view of the ChloraPrep PAR.

Before reaching a final conclusion regarding Petitioner’s obviousness challenge to the ’642 patent, however, we consider Patent Owner’s objective indicia evidence to determine if it outweighs Petitioner’s showing regarding the ChloraPrep PAR.

## 2. *Analysis of Objective Indicia of Non-Obviousness*

Factual inquiries for an obviousness determination include an evaluation and crediting of objective evidence of nonobviousness. *See Graham*, 383 U.S. at 17. Objective evidence of non-obviousness “may often be the most probative and cogent evidence in the record” and “may often

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establish that an invention appearing to have been obvious in light of the prior art was not.” *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349 (Fed. Cir. 2012). Thus, notwithstanding what the teachings of the prior art would have suggested to one skilled in the art, secondary considerations (objective evidence of nonobviousness) may lead to a conclusion that the challenged claims would not have been obvious. *In re Piasecki*, 745 F.2d 1468, 1471–72 (Fed. Cir. 1984). Objective indicia of non-obviousness can include any of the following: long-felt but unsolved needs, failure of others, unexpected results, commercial success, copying, licensing, and praise. *See Graham*, 383 U.S. at 17; *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007).

In order to accord substantial weight to objective evidence of nonobviousness, “the evidence of secondary considerations must have a ‘nexus’ to the claims, i.e., there must be ‘a legally and factually sufficient connection’ between the evidence and the patented invention.” *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1332 (Fed. Cir. 2019) (quoting *Demaco Corp. v. F. Von Lang-sdorff Licensing Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988)). Although the patent owner bears the initial burden of proving a nexus (*WMS Gaming Inc. v. Int’l Game Tech.*, 184 F.3d 1339, 1359 (Fed. Cir. 1999)), a presumption of nexus may be appropriate if the patent owner shows “the asserted objective evidence is tied to a specific product and that product ‘embodies the claimed features, and is *coextensive with them.*’” *Polaris Indus, Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1072 (Fed. Cir. 2018) (quoting *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1130 (Fed. Cir. 2000) (emphasis added)). On

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the other hand, “[w]hen the [product] is not coextensive with the patented invention—for example, if the patented invention is only a component of a commercially successful machine or process,” the patent owner is not entitled to a presumption of nexus. *Demaco*, 851 F.2d at 1392.

Here, we find nexus because the ’067 patent claims are embodied by and coextensive with the ChloroPrep product. *See* Ex. 1030 ¶¶ 17–45; *see also* Section III.A. (finding the ’067 patent claims anticipated by ChloroPrep PAR). Regardless of whether we find a nexus our ultimate conclusions regarding each of Patent Owner’s alleged objective indicia of non-obviousness would not change.

Regarding the specific objective indicia of non-obviousness, Patent Owner argues that long-felt but unresolved need, skepticism and failure of others, industry praise, and commercial success linked to the invention indicates that the claims would not have been obvious to a person of ordinary skill in the art. PO Resp. 58–68.

*a) Long-Felt but Unsolved Need*

Patent Owner argues that the inventors of the ’642 Patent “solved a long-felt but unmet need for a sterilized chlorhexidine product that allows for the containment, delivery, and application of a sterilized CHG composition.” PO Resp. 58. Patent Owner also argues that the industry “was very concerned about mitigating ongoing outbreaks and deaths due to contaminated antiseptic products.” *Id.* (citing Ex. 2023 ¶¶ 421–423; Ex. 2003). And, according to Patent Owner, to address mounting concerns, the FDA convened hearings in 2012 to address whether sterilization should be required. *Id.* Patent Owner asserts that “[d]uring the hearings, numerous stakeholders commented on the ‘technical challenges’ associated with

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sterilizing antiseptics including comments that sterilization would be ‘impossible or impractical.’” *Id.* at 58–59 (citing Ex. 2023 ¶¶ 423–424; Ex. 2002, 23, 25; Ex. 2004, 2172; Ex. 2007, 14–15, 17). Patent Owner further asserts that “industry representatives emphasized the challenges these processes entailed and the difficulties of achieving sterility” with CHG being “known as particularly problematic.” *Id.* at 59 (citing Ex. 2002, 24; Ex. 2023 ¶¶ 425–426).

We are not persuaded. To establish a long-felt need, three elements must be proven: First, the need must have been a persistent one that was recognized by ordinarily skilled artisans. *In re Gershon*, 372 F.2d 535, 538 (CCPA 1967). Second, the long-felt need must not have been satisfied by another before Appellant’s invention. *See Newell Companies, Inc. v. Kenney Mfg. Co.*, 864 F.2d 757, 768 (Fed. Cir. 1988). Third, the invention must, in fact, satisfy the long-felt need. *In re Cavanagh*, 436 F.2d 491, 496 (CCPA 1971). Patent Owner’s argument is lacking as to all elements. The articles cited by Patent Owner range from 2007 to 2012 but fail to account for the disclosure in Degala that demonstrates sterilization of a chlorhexidine gluconate composition was known and being improved upon by 2015. *See* Ex. 1007 ¶¶ 2, 3, 7, 50, 52. *Newell Companies*, 864 F.2d at 768 (“[O]nce another supplied the key element, there was no long-felt need or, indeed, a problem to be solved.”). And, Patentee’s expert stated he was unaware of any evidence of long-felt need or skepticism after the publication of Degala. *See, e.g.*, Ex. 1040, 309:7–310:20; 307:16–308:17.

Patent Owner’s citations to a marketing brochure of a product being released in 2019 in the U.S. do not alter the fact that methods of sterilizing CHG compositions were known and that a product including a sterilized

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CHG composition was being sold in the UK. *See* PO Resp. 60–61 (citing Ex. 2007, 14, 17); ; Ex. 1007 ¶ 2; Ex. 1044, 41; Ex. 1007 ¶ 2; Ex. 1037 ¶¶ 1–7; Ex. 1038 ¶ 6. Additionally, Scholz teaches that products containing chlorhexidine gluconate compositions may be terminally sterilized by known techniques (Ex. 1008 ¶ 178) and Chiang teaches that CareFusion’s ChloroPrep applicator, which included a CHG composition, was terminally sterilized using ethylene oxide (Ex. 2015 ¶ 10). These disclosures further indicate there was not a long-felt but unmet need in the industry.

Accordingly, we give little weight to Patent Owner’s argument that there was a long-felt but unmet need.

*b) Skepticism in the Industry*

Patent Owner argues there was concern among manufacturers of sterilized antiseptics that the “FDA would impose a requirement that topical antiseptics be sterilized because they were skeptical that [a person of ordinary skill in the art] could develop sterilized antiseptic products. *See* PO Resp. 61 (citing Ex. 2023 ¶¶ 435–440). According to Patent Owner, “[m]any comments from the FDA hearings were directed to the challenges associated with manufacturing sterilized antiseptics.” *Id.* Patent Owner cites to a 2013 article from The Society for Healthcare Epidemiologists, which “agree[d] that products used for aseptic procedures need be sterile, however, it acknowledge[d] that sterilization of topical antiseptics is problematic.” *Id.* (citing Ex. 2002, 10). Patent Owner notes that the 2013 article “urge[d] FDA to engage manufacturers however on the possible technical limitations of sterilization of select topical antimicrobials such as chlorhexidine gluconate (CHG).” *Id.*



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For the same reasons discussed above with regard to “long felt but unmet need,” we are unpersuaded by Patent Owner’s position. Accordingly, we give little weight to Patent Owner’s argument that there was skepticism in the industry.

*c) Failure of Others*

Patent Owner argues that a person of ordinary skill the art would have recognized that, “at the time of the invention, others tried and failed to develop sterilized chlorhexidine products and articles including sterilized CHG and the field was nascent.” PO Resp. 63 (citing Ex. 2023 ¶¶ 441–447.) Patent Owner cites to the ’642 Patent, Degala, and Margoosian to bolster its argument that “there were many challenges faced by [a person of ordinary skill the art] in trying to create sterilized CHG products and articles including the potential for degradation” and that others failed to describe or create “any validated methods for sterilizing CHG compositions.” *Id.* at 63–64 (citing Ex. 1001, 14:42–45; 17:14–18; Ex. 1007 ¶¶ 3–4; Ex. 2023 ¶¶ 444–446; Ex. 2035, 7–8).

For the same reasons discussed above with regard to “long felt but unmet need,” we are unpersuaded by Patent Owner’s position. Accordingly, we give little weight to Patent Owner’s argument that there was failure of others in the industry.

*d) Industry Praise and Commercial Success of the ChloroPrep USA Product*

Patent Owner contends that Petitioner’s fully-sterilized ChloroPrep products released in the United States in 2019 are covered by the claims of the ’642 Patent and quickly became successful. PO Resp. 64–65 (citing Ex. 1030, 8–16; Ex. 2041, 97, 98–103; Exs. 2026–2030). According to

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Patent Owner, “the difference between Petitioner’s original [unsterilized] products and the fully-sterilized ones are the invention itself—fully sterilized products with sterilized CHG composition”—which demonstrates the commercial success of the ’642 patent. *Id.* at 66 (citing Ex. 2025; Ex. 2031, 4, 7, 12).

Patent Owner argues that “[d]espite the impact of COVID-19 on elective surgeries, Petitioner’s fully-sterilized ChloroPrep product generated millions in revenue after launch in 2019.” *Id.* at 66–67 (citing Ex. 2023 ¶ 451; Ex. 2026, 3 (over ██████ in FY 2020); Ex. 2027, 4 (over ██████ in FY 2021); Ex. 2028, 2 (over ██████ from FY Dec. 2021-FY Nov. 2022); Ex. 2029 (high volume of sales by customer)). Indeed, according to Patent Owner, from April 2020 to March 2021, Petitioner captured over half of the U.S. market for preoperative skin preparation products with its sterilized products. *Id.* at 67 (citing Ex. 2030, 2). Patent Owner further argues that upon recognizing the value of the invention, Petitioner initiated a plan to discontinue its non-sterilized products and ██████ for its fully-sterilized products. *Id.* (citing Ex. 2031, 8, 11.)

We agree that the market share and sales information presented by Patent Owner demonstrates considerable sales of the ChloroPrep USA products within the U.S. market. We do not agree, however, that Petitioner’s release of its ChloroPrep UK product into the U.S. market demonstrates commercial success for several reasons.

As an initial matter, Dr. Rutala testified that there could be many factors beyond the use of the invention that contributes to revenue or units sold but that he did not evaluate those other factors because “[he] didn’t

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have the information nor would [he] know how to use it if [he] had it.” *See* Ex. 1040, 292:9–293:8.

Moreover, Sean Sheridan, Ph.D. (“Dr. Sheridan”) testified that “the introduction of the Sterilized ChloraPrep products did not lead to any material change in sales of ChloraPrep products which were significant and growing for years prior to Q4 2019.” *See* Ex. 1039 ¶ 33; *see also, id.* ¶ 30 (Dr. Sheridan’s testimony that the release of the sterilized U.S. product did not result in “materially different” unit sales than would have been expected based on sales of the unsterilized U.S. product). Dr. Sheridan further testified that “[t]he profitability data in the documents cited by Dr. Rutala indicate that the introduction of the Sterilized ChloraPrep products [REDACTED]

[REDACTED] *Id.* ¶ 35. Dr. Sheridan went on to testify that “the introduction of the Sterilized ChloraPrep products appears to be correlated with a decrease in BD’s share of the relevant market.” *Id.* ¶ 39. We credit Dr. Sheridan’s testimony.

Accordingly, we give little weight to Patent Owner’s argument that sales of the ChloraPrep USA products demonstrate commercial success.

For industry praise, Patent Owner relies on the marketing materials accompanying the release of Petitioner’s sterilized U.S. product, arguing:

Petitioner has touted its sterilized products as “[n]ew, advanced technology” with “the lowest risk of intrinsic contamination available.” . . . And in its marketing materials, Petitioner praised its product development, telling customers that “[s]terilizing antiseptic solutions is a difficult challenge” and that “manufacturers have asserted . . . is ‘impossible or impractical’” because “[c]onventional terminal sterilization processes . . . are not compatible with common antiseptics, including CHG and can damage the chemical integrity of the active ingredient.”

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PO Resp. 65 (citing Ex. 2007, 4, 14, 15). Petitioner’s marketing puffery does not weigh heavily in our analysis because the evidence supports that it was selling a product including a sterilized CHG composition well before the introduction of its sterilized U.S. product. Moreover, to the extent there was a technology advance accompanying the launch of Petitioner’s sterilized U.S. product, the advance appears to relate not to the ability to sterilize CHG, but to a method for doing so with a “shorter, more efficient processing time.” *See* Ex. 1007 ¶¶ 2, 5, 7 (describing known sterilization method and improved method addressing the need for a “shorter, more efficient” method). In this regard, we note that the challenged claims do not restrict the method by which CHG is sterilized.

*e) Summary of Analysis of Secondary Considerations of Non-Obviousness*

Patent Owner has demonstrated a sufficient nexus between the claimed invention and the ChloroPrep UK products. For the reasons discussed above, however, we give little weight to Patent Owner’s assertions that the claimed invention satisfies a long-felt but unmet need for the claimed invention, was met by skepticism, was preceded by the failure of others to develop similar products, enjoyed commercial success, or was received with praise in the industry.

*3. Conclusion on Claims*

As discussed above, the record supports that a person of ordinary skill in the art would have had reason to comply with relevant standards, that it was known how to sterilize CGH and how to terminally sterilize a product using, e.g., ethylene oxide, and that it was known that there were products on the market that had been terminally sterilized and that included sterilized

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CGH. Considering this evidence together with the objective indicia of non-obviousness presented by Patent Owner, we find that the preponderance of the evidence supports that it would have been obvious to sterilize everything identified as “sterile” in the ChloraPrep PAR.

#### 4. *Conclusion*

For the foregoing reasons, we find Petitioner has proven by a preponderance of the evidence that ChloraPrep PAR teach or suggest all elements of challenged claims 1–3, 5–8, 10–18, and 20 of the ’642 patent. Furthermore, we find that the use of the ChloraPrep PAR would have been within the level of ordinary skill in the art, as evidenced by the prior art of record. We, therefore, conclude Petitioner has demonstrated by a preponderance of the evidence that claims 1–3, 5–8, 10–18, and 20 would have been obvious in view of ChloraPrep PAR, and thus, are unpatentable under 35 U.S.C. § 103.

#### C. *Alleged Obviousness of Claims 1–3, 5–8, 10–18, and 20 in View of ChloraPrep PAR and Degala*

Petitioner contends claims 1–3, 5–8, 10–18, and 20 would have been obvious to a person of ordinary skill in the art at the critical time in view of ChloraPrep PAR and Degala. Pet. 56–64. Patent Owner disagrees, arguing, *inter alia*, that the combination of references does not cure the problem with ChloraPrep PAR because PAR does not disclose the “sterilized” limitation[s].” PO Resp. 47–54. Patent Owner also argues that Petitioner fails to explain why a person of ordinary skill in the art would have been motivated to combine ChloraPrep PAR and Degala or why there would be a reasonable expectation of success. *Id.* at 54–56. As discussed in detail below, we find Petitioner has demonstrated by a preponderance of the

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evidence that challenged claims 1–3, 5–8, 10–18, and 20 would have been obvious to a person of ordinary skill in the art under 35 U.S.C. § 103 in view of ChloraPrep PAR and Degala.

*1. Analysis of the Challenged Claims*

*a) Claims 1 and 12*

Petitioner relies on its arguments regarding ChloraPrep PAR in addition to Degala’s disclosure when contending that the combined teachings of ChloraPrep PAR and Degala would have rendered challenged claims 1 and 12 obvious to a person of ordinary skill in the art at the critical time. Pet. 56–64 (citing Ex. 1003 ¶¶ 148–166). Petitioner argues that in addition to the ChloraPrep PAR’s disclosure, Degala provides a detailed description of a method to sterilize an “antiseptic solution”:

[T]he method for sterilizing an antiseptic solution comprises providing a container containing the antiseptic solution . . . ; selecting a sterilization temperature from about 85° C. to about 135° C. and a sterilization time from about 1 minute to about 19 hours; heating the antiseptic solution to the selected sterilization temperature; maintaining the antiseptic solution at the selected sterilization temperature for the selected sterilization time; and terminating the heating of the antiseptic solution when the selected sterilization time expires.

*Id.* at 56 (citing Ex. 1007 ¶ 7). According to Petitioner, “Degala teaches that this process can be used with an antiseptic solution that ‘comprises about 70% v/v isopropanol in water and about 2.0% w/v chlorhexidine gluconate,’” which Petitioner contends is “the same solution described in the ChloraPrep PAR.” *Id.* (citing Ex. 1007 ¶ 16). And, Petitioner asserts that Degala teaches that “‘the container may be made of a frangible material such that upon application of sufficient force the container fractures,’ which again

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is consistent with the ChloraPrep PAR.” *Id.* (citing Ex. 1007 ¶ 26).

Petitioner also asserts that “Degala discusses the ChloraPrep product as embodied in the ChloraPrep PAR and states that is ‘sterilized for EU countries using a known sterilization method.’” *Id.* at 59 (citing Ex. 1007 ¶ 2).

Petitioner contends that “Degala’s disclosure in totality refers to means of sterilization to achieve a sterile condition, including through validated sterility processing that renders the product free of viable microorganisms.” Pet. 58. Petitioner notes that Degala “defines ‘sterile’ based on international requirements for qualification as sterile, stating, ‘[a]s used herein, sterile means ‘7 day sterility’ as tested following the procedures described in U.S. Pharmacopeial Convention (USP) Chapter 55 ‘Biological Indicators—Resistance Performance Tests.’” *Id.* (citing Ex. 1007 ¶ 40). Thus, Petitioner concludes that the combined teachings of ChloraPrep PAR and Degala would have rendered claims 1 and 12 obvious to a person of ordinary skill in the art. *Id.* at 58.

Patent Owner contends that the combination of ChloraPrep PAR and Degala fails to fill numerous missing elements from claims 1 and 12. PO Resp. 48. Patent Owner first argues that Degala does not disclose a sterilized CHG composition that is subject to a suitable sterilization process such that sterility can be validated. *Id.* (citing Ex. 2023 ¶¶ 363, 370–372). According to Patent Owner, a person of ordinary skill in the art would have understood that “passing a sterility test on a particular instance does not mean that a particular sterilization process itself has been validated, i.e., that procedures have been established to show that the process consistently, reliably, and reproducibly results in a product that is sterile (e.g., according

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to that sterility test).” *Id.* at 49. Patent Owner asserts that the “7-day sterility test” in Degala only “provides a way to check ‘viable spore count’ resulting from a particular process” regardless of whether or not that process was validated. *Id.*

Patent Owner then contends that even if a “sterilized [CHG] composition” were disclosed, “Petitioner failed to establish how the combination discloses a ‘sterilized chlorhexidine product’ or a ‘sterilized chlorhexidine article.’” *Id.* (citing Ex. 2023 ¶¶ 363, 367–369). Patent Owner asserts that “Petitioner glosses over these limitations,” but “in allowing the claims, the PTO emphasized that ‘the prior art does not teach a product which is itself necessarily sterilized and comprising sterilized chlorhexidine gluconate as further recited in the claims.’” *Id.* (citing Ex. 1002, 99).

Lastly, Patent Owner again argues that a person of ordinary skill in the art at the critical time would not understand “sterile” to mean “sterilized” based on “unidentified ‘international standards regarding sterility.’” *Id.* (citing Pet. 58).

For the reasons detailed above, *see* Sections III.A and B., *supra*, the trial record supports a finding that the ChloraPrep PAR teaches or suggests all the limitations of the challenged claims, including separately sterilizing a chlorhexidine gluconate composition within a product and sterilizing a complete final article. In addition to the teachings of ChloraPrep PAR explained previously, Degala explicitly discloses sterilizing a chlorhexidine gluconate composition via a cascading-water sterilization process and further discloses that the process produces a SAL of  $10^{-6}$ . *See* Ex. 1007 ¶¶ 41, 43, 45, 49, 52, 54, Tables 11, 12, and 14; *see also* Ex. 1040, 325:9–



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327:22 (Dr. Rutala testifies “Degala teaches a CHG method to achieve sterilization of a CHG composition”). Additionally, as discussed previously, Dr. Rutala conceded that “you have to have a validated sterility process to have a sterility assurance level.” Ex. 1043, 159:20–25.

Taking the complete record into account, including the objective indicia of non-obviousness (discussed *supra* § III.B.2), we find that the combination of ChloroPrep PAR and Degala would have rendered obvious the sterilization of a complete final product that includes a sterilized chlorhexidine gluconate composition. As discussed previously, the ChloroPrep PAR states that the ChloroPrep UK product has both a sterile CHG solution and a sterile applicator. Ex. 1006, 7, 10, 17. Additionally, as discussed previously *see* Sections III.A.1., *supra*, terminal sterilization techniques and their use on packaging of products containing chlorhexidine gluconate compositions were well-known and routine as of 2015 ¶ 10. *See* Ex. 1003 ¶ 71; Ex. 1040, 141:18–143:6, 147:10–11, 190:6–20; Ex. 2015; Ex. 1017, Part 1. In fact, the ChloroPrep USA product was subject to termination sterilization in 2015. Ex. 2006.

Therefore, considering the knowledge of those skilled in the art and the regulatory requirements for the ChloroPrep UK product, as well as the other evidence of record, including the objective indicia of non-obviousness, we find that after reading the ChloroPrep PAR and Degala, a person of ordinary skill in the art in at the time of the invention would have found it obvious to sterilize the CHG solution and to terminally sterilize the product described in the ChloroPrep PAR if it had not already been subject to such a process.

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Accordingly, based on the entirety of the proceeding record, we conclude Petitioner has demonstrated by a preponderance of the evidence that independent claims 1 and 12 would have been obvious under 35 U.S.C. § 103 in view of ChloraPrep PAR and Degala.

Patent Owner argues that Petitioner fails “to present any cogent reason why a [person of ordinary skill in the art] would have been motivated to combine [ChloraPrep] PAR and Degala or why there would be a reasonable expectation of success.” PO Resp. 54 (citing Ex. 2023 ¶¶ 403–414). According to Patent Owner, a person of ordinary skill in the art would not have understood a reference “to an unidentified CareFusion product somewhere in the EU in 2014 as a ‘specific reference’ to the ChloraPrep UK products allegedly referenced in a 2010 PAR.” *Id.* at 55 (citing Ex. 2023 ¶¶ 406, 364–65). Patent Owner additionally argues that Degala teaches away from the product in the ChloraPrep PAR because “the product is heavily criticized Paragraphs 3 to 5 due to its numerous ‘undesired impurities’ from ‘overly degrading the antimicrobial molecules.’” *Id.* (citing Ex. 1007 ¶¶ 3–5; Ex. 2023 ¶¶ 407–408). Patent Owner further argues “Petitioner has no evidence that a [person of ordinary skill in the art] would have a reasonable expectation of success at arriving at the claimed inventions given the numerous challenges facing POSAs and the prior failures by others.” *Id.* at 56–57 (citing Ex. 2023 ¶¶ 410–414).

We do not agree with Patent Owner. The record supports a finding that a person of ordinary skill in the art would have had reason to combine the teachings of ChloraPrep PAR and Degala and would have had a reasonable expectation of success in combining the teachings of both references. First, we do not agree that Degala disparages or heavily

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criticized the ChloroPrep product. *See* Ex. 1007 ¶¶ 3–5. Rather, Degala teaches an improvement upon the method used previously in the industry. *Id.* Based on Degala’s own teachings, we find a person of ordinary skill in the art would have readily applied Degala’s technique to that in the ChloroPrep PAR. An improvement suggested by the prior art is not a teaching away, particularly when the purpose of the prior art is not destroyed, but improved upon. *Ricoh Co., Ltd. v. Quanta Comp. Inc.*, 550 F.3d 1325, 1332 n. 5 (Fed.Cir.2008) (citing *In re Fulton*, 391 F.3d 1195, 1201 (Fed.Cir.2004) (refusing to conclude that prior art disclosure taught away from the claimed invention where the disclosure did not “criticize, discredit, or otherwise discourage the solution claimed”)).

Second, we credit the testimony of Dr. Dabbah who notes that “Degala expressly references the product discussed in the ChloroPrep PAR, noting prior techniques for sterilizing the solution and ampoule were known and describing additional methods. Therefore, I consider that it would have been obvious to combine these teachings.” Ex. 1003 ¶ 146; *see also* Ex. 1007, code 71 (Applicant: CareFusion 2200, Inc.), ¶ 2 (“A known antiseptic solution containing 2% w/v chlorhexidine gluconate in 70% v/v isopropanol in water, manufactured by CareFusion Corp., is sterilized for EU countries using a known sterilization method.”); Ex. 1005, 4. Lastly, the record is replete with citations indicating that CareFusion, the applicant for Degala, was the company that originally produced the ChloroPrep product. *See* Ex. 2006; Ex. 2008 (FDA website referencing ChloroPrep labels); Ex. 2015 ¶ 8 (“the ChloroPrep® products commercially available from CareFusion”) ¶ 10; Ex. 2016, 12, 13.

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Given that (1) Degala teaches that in some jurisdictions, such as EU countries, some degree of sterilization is required, (2) Degala discloses an improved technique for sterilizing a chlorhexidine gluconate composition, (3) Degala was filed by CareFusion, the same company that originally produced the ChloroPrep and (4) per Dr. Dabbah, the composition in Degala is the same one described in ChloroPrep PAR, we find that one skill in the art would have had a reason to and a reasonable expectation of success in combining the teachings of the prior art references. *See Power-One, Inc., v. Artesyn Techs., Inc.*, 599 F.3d 1343, 1351 (Fed. Cir. 2010) (an invention is not obvious just “because all of the elements that comprise the invention were known in the prior art;” rather a finding of obviousness at the time of invention requires a “plausible rational [sic] as to why the prior art references would have worked together.”); *Amgen Inc. v. F. Hoffman-LA Roche Ltd.*, 580 F.3d 1340, 1362 (Fed. Cir. 2009) (“An obviousness determination requires that a skilled artisan would have perceived a reasonable expectation of success in making the invention in light of the prior art.”); *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 538, 416 (2007) (The primary basis for a rationale to support a conclusion that a claim would have been obvious is that all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded nothing more than predictable results to one of ordinary skill in the art.). Considering the entire record, including the objective indicia of non-obviousness, we find that the person of ordinary skill in the art would have had reason to sterilize the things identified as

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“sterile” in the ChloraPrep PAR and would have had a reasonable expectation of success in doing so.

*b) Dependent Claims 7, 8, 17, and 18*

Claims 7, 8, 17, and 18 include limitations requiring a sterilized additive, specifically a sterilized colorant. Ex. 1001, 27:40–48, 28:35–43.

Petitioner contends that ChloraPrep PAR in combination with Degala renders this claim limitation obvious because the improved sterilization methods disclosed in Degala are generally applicable to “antiseptic solution[s] contained in a container” and that the “[p]referred antiseptic agents include octenidine, such as octenidine dihydrochloride, and chlorhexidine, such as chlorhexidine gluconate.” Pet. 60 (citing Ex. 1007 ¶¶ 25, 30); Reply 21. Moreover, according to Petitioner, Degala teaches that its novel sterilization methods can be applied more generally to “medicaments, chemical compositions, cleansing agents, cosmetics, or the like.” Pet. 60 (citing Ex. 1007 ¶ 27). Therefore, Petitioner argues that a skilled artisan would have been motivated to apply the sterilization methods described in Degala to the particular antiseptic solution described in the ChloraPrep PAR, which contains, inter alia, a colorant. *Id.* Petitioner further argues that “a skilled artisan would be particularly motivated to do so in light of the description in the ChloraPrep PAR that the antiseptic solution is ‘sterile.’” *Id.* at 60–61 (citing Ex. 1005, 7). Petitioner asserts that a skilled artisan also would have understood that “the sterilization process applied to the ampoule containing the chlorhexidine gluconate composition must also be applied to additives included therein.” *Id.* at 61. Thus, Petitioner concludes that “applying the sterilization methods of Degala to the

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antiseptic solution of the ChloroPrep PAR would result in a ‘sterilized colorant.’” *Id.* (citing Ex. 1003 ¶¶ 159–62).

Patent Owner disagrees with Petitioner and notes that Degala teaches its “sterilization methods can be applied more generally to ‘medicaments, chemical compositions, cleansing agents, cosmetics, or the like.’” PO Resp. 52 (citing Pet. 60). But, Patent Owner argues, “none of these is alleged to be one of the seven claimed additives and, in any case, Degala does not teach subjecting any to its sterilization method.” *Id.* (citing Ex. 1007 ¶ 27 (“[w]hile antiseptic solutions are of particular focus herein, the container may alternatively contain medicaments, . . .”); Ex. 2023 ¶¶ 396–397).

Patent Owner further argues “Petitioner has not established the PAR discloses a CHG composition containing a colorant.” *Id.* (citing Ex. 2023 ¶¶ 272, 395). Patent Owner then asserts that “Petitioner cites no evidence that it was known to sterilize any additive (much less a colorant in a CHG composition) or that it could be done with a reasonable expectation of success.” *Id.* (citing Ex. 2023 ¶¶ 397–398, 400). Indeed, according to Patent Owner, “Chiang stated that the dye in ChloroPrep was separate from the CHG composition and described how the combination of dyes with CHG presented further stability challenges.” *Id.* (citing Ex. 2015 ¶ 13, Ex. 2023 ¶ 398).

We do not agree with Patent Owner and find that the preponderance of the evidence in the record supports Petitioner’s position. Specifically, as discussed previously *supra* § III.A.7, we find that the ChloroPrep PAR has a colorant because it states explicitly that the ChloroPrep includes a tint. *See* Ex. 1006, 1 (the coversheet states “ChloroPrep *with Tint* 2% w/v/70%v/v

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Cutaneous Solution”), 7 (when describing the nature and contents of the container, it states “ChloraPrep *with Tint* is a sterile alcoholic antiseptic solution.”).

The ChloraPrep PAR also lists the colorant Sunset Yellow (E110) as an excipient. *Id.* at 7, 17. The ChloraPrep PAR explains that “Sunset yellow (E110) is commonly used as an excipient or additive in medicinal and food products.” *Id.* at 19. Dr. Rutala testified that an excipient in a CHG composition is “an inactive ingredient in the composition” and is “essentially the medium in some way for the active substance.” Ex. 1040, 234:15–239:7. He further testified that if a “composition is sterile . . . the excipients have to be sterile.” *Id.* This testimony is supported by Dr. Dabbah, who testifies regarding Sunset Yellow that “[a]s an excipient included within the sterilized chlorhexidine gluconate solution, that colorant is similarly sterile and sterilized” and “approval of ChloraPrep’s description as a sterile composition in the ChloraPrep PAR, requires the sterilization of all substances in the solution.” Ex. 1003 ¶ 127.

Therefore, as discussed previously *supra* § III.A.7, we find that Sunset Yellow is a colorant and a commonly used excipient for medicinal products, and as such is part of the sterilized composition. Accordingly, we conclude Petitioner has demonstrated by a preponderance of the evidence that challenged dependent claims 7, 8, 17, and 18 would have been obvious to a person of ordinary skill in the art under 35 U.S.C. § 103 in view of ChloraPrep PAR and Degala.

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*c) Dependent Claims 10 and 19*

Petitioner contends Degala renders dependent claims 10 and 19 obvious because it provides detailed disclosure of achieving a SAL of  $10^{-3}$  to  $10^{-9}$ :

In another aspect of the present invention, it was found that the inventive method has a sterility assurance level (SAL) of at least about  $10^{-6}$  under particular combination of sterilization temperature and sterilization time.... For example, it has been found that a method of exposing the antiseptic solution to a temperature of  $100^{\circ}\text{C}$ . for about 50 minutes, a temperature of  $105^{\circ}\text{C}$ . for about 17 minutes, or  $110^{\circ}\text{C}$ . for about 6 minutes would each have a SAL of at least  $10^{-6}$  (i.e., a 1/1,000,000 chance that a viable microbe will be present in a sterilized solution).

Pet. 60 (citing Ex. 1007 ¶ 41); *see* Reply 21 (citing Ex. 1017, 8).

Additionally, Petitioner notes Degala's statement that, "further testing was conducted to determine at what time the Sterility Assurance Level (SAL) of  $10^{-6}$  can be reached at a certain temperature." *Id.* (citing Ex. 1007 ¶ 52).

Patent Owner contends that ChloraPrep PAR and Degala do not render claims 10 and 19 obvious because the claims require the product or article to have a "sterility assurance level from  $10^{-3}$  to  $10^{-9}$ " and this limitation is not satisfied by a sterilized solution. PO Resp. 53 (citing Ex. 2023 ¶¶ 381–382). Patent Owner cites to the '642 Patent to support its position that "the SAL of a product/article is not the same as the SAL of a solution":

In some embodiments, the chlorhexidine article 14 has a SAL of from  $10^{-3}$  to  $10^{-9}$ . As described above, the components of the sterilized chlorhexidine article 14 may also have a SAL corresponding to the SAL of the sterilized chlorhexidine article 14 . . . *Id.* (citing Ex. 1001, 16:63–67; Ex. 2023 ¶ 382). Patent Owner further contends Petitioner failed to establish



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that the claimed SAL range would have been obvious to a person of ordinary skill in the art. *Id.* (citing Ex. 2023 ¶¶ 379–387).

We do not agree with Patent Owner. Rather, for the same reasons discussed previously *supra* §§ III.A.1.a and III.A.8., we find that the record supports that claims 10 and 19 would have been obvious to a person of ordinary skill in the art at the critical time.

*d) Dependent Claims 2, 3, 5, 6, 11, and 13–16*

Petitioner argues dependent claims 2, 3, 5, 6, 11, and 13–16 are each rendered obvious in view of ChloraPrep PAR in combination with Degala. Pet. 38–43, 48 (citing Ex. 1003 ¶¶ 114–126, 135–137); Reply 20 (citing Ex. 1006, 5).

Patent Owner argues the ChloraPrep PAR fails to disclose the limitations required by dependent claims 2, 3, 5, 6, 11, and 13–16. PO Resp. 54 (citing Ex. 2023 ¶ 402). Patent Owner specifically argues that these challenged dependent claims are not obvious at least because they are not anticipated by the ChloraPrep PAR and claims 1 and 12, from which these claims depend, are not obvious in view of the ChloraPrep PAR alone or in combination with Degala. *Id.*

We have considered carefully all arguments and supporting evidence in light of the limitations recited in challenged dependent claims 2, 3, 5, 6, 11, and 13–16. Based on the entirety of the proceeding record, we conclude Petitioner has demonstrated by a preponderance of the evidence that challenged dependent claims 2, 3, 5, 6, 11, and 13–16 would have been obvious to a person of ordinary skill in the art under 35 U.S.C. § 103 in view of ChloraPrep PAR and Degala.

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#### IV. MOTIONS FOR A PROTECTIVE ORDER AND TO SEAL

Patent Owner moves for entry of a stipulated protective order and for an order sealing Exhibits 2026–2032 and 2045 as well portions of the Patent Owner Response and the Declaration of Dr. Rutala (Ex. 2023) that quote these exhibits. Paper 25; Paper 36. These motions are unopposed.

A party may move to seal confidential information including, *inter alia*, sensitive commercial information. Consolidated Patent Office Trial Practice Guide, 19 (Nov. 2019); 37 C.F.R. § 42.54. It is the movant’s burden to show good cause for sealing such information, and we balance the party’s asserted need for confidentiality with the strong public interest in open proceedings. *Argentum Pharms. LLC v. Alcon Research, Ltd.*, IPR2017-01053, Paper 27 at 4 (PTAB Jan. 19, 2018) (informative).

Patent Owner provides a sufficient explanation for sealing the identified exhibits and the portions of the Patent Owner Response and the Rutala Declaration that quote those exhibits. Exhibits 2026–2030 include Petitioner’s sales data and projections. Exhibit 2031 is a document relating to Petitioner’s business strategy for ChlorPrep. Exhibit 1032 comprises internal meeting minutes relating to a U.S. FDA public hearing. And portions of Exhibit 2045 specify confidential parameters of Petitioner’s manufacturing process.

Our Decision does not rely heavily on any of the material at issue and Patent Owner has established good cause for sealing 2026–2032 and 2045 as well the portions of the Patent Owner Response and the Declaration of Dr. Rutala that quote those exhibits. Accordingly, we grant Patent Owner’s request to seal Exhibits 2026–30 and the portions of the Patent Owner

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Response and the Declaration of Dr. Rutala that quote those exhibits.

Additionally, we enter the default Protective Order in this case.

Patent Owner has not filed a public version of the Declaration of Dr. Rutala (Ex. 2023) in this case. Patent Owner is ordered to do so within five business days of the entry of this Decision.

## V. CONCLUSION

Based on the evidence presented with the Petition, the evidence introduced during the trial, and the parties' respective arguments, Petitioner has shown by a preponderance of the evidence that the challenged claims 1–3, 5–8, 10–18 and 20 would have been obvious in view of ChloraPrep PAR alone or in combination with Degala.<sup>16</sup>

In summary:

<b>Claims</b>	<b>35 U.S.C. §</b>	<b>Reference(s)/ Basis</b>	<b>Claims Shown Unpatentable</b>	<b>Claims Not Shown Unpatentable</b>
1–3, 5–8, 10–18, 20	102	ChloraPrep PAR	1–3, 5–8, 10–18, 20	
1–3, 5–8, 10–18, 20	103(a)	ChloraPrep PAR	1–3, 5–8, 10–18, 20	

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<sup>16</sup> Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding after the issuance of this Final Written Decision, we draw Patent Owner's attention to the April 2019 Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. §§ 42.8(a)(3), (b)(2).

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<b>Claims</b>	<b>35 U.S.C. §</b>	<b>Reference(s)/ Basis</b>	<b>Claims Shown Unpatentable</b>	<b>Claims Not Shown Unpatentable</b>
1-3, 5-8, 10-18, 20	103(a)	ChloraPrep PAR, Degala	1-3, 5-8, 10- 18, 20	
<b>Overall Outcome</b>			1-3, 5-8, 10- 18, 20	

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## VI. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1–3, 5–8, 10–18, and 20 in the '642 patent is determined to be unpatentable; and

FURTHER ORDERED that Patent Owner's Motion for Entry of Stipulated Protective Order (Appendix A to Paper 19) and to Seal is *granted*;

FURTHER ORDERED that Petitioner's Motion to Seal (Paper 30) is *granted*;

FURTHER ORDER that Patent Owner shall file a redacted public version of Ex. 2023 within five business days of the entry of this order;

FURTHER ORDERED that, because this is a Final Written Decision, the parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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Paper 41  
Date: January 9, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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BECTON DICKINSON AND COMPANY,  
Petitioner,

v.

SAGE PRODUCTS, LLC,  
Patent Owner.

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Patent 10,688,067B1

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Before JAMES A. TARTAL, GEORGIANNA W. BRADEN, and  
DAVID COTTA, *Administrative Patent Judges*.

BRADEN, *Administrative Patent Judge*.

JUDGMENT

Final Written Decision

Determining All Challenged Claims Unpatentable

*35 U.S.C. § 318(a)*

Granting Patent Owner's Motion for Entry of Protective Order and to Seal

37 C.F.R. §§ 42.14, 42.54

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We have jurisdiction to hear this *inter partes* review under 35 U.S.C. § 6, and this Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). For the reasons that follow, we determine Becton Dickinson and Company (“Petitioner”) has shown by a preponderance of the evidence that claims 1–3, 5–8, and 10–19 of U.S. Patent No. 10,688,067 B1 (Ex. 1001, “the ’067 patent”) are unpatentable.

## I. INTRODUCTION AND BACKGROUND

### A. *Procedural History*

Petitioner filed a Petition requesting an *inter partes* review of claims 1–3, 5–8, and 10–19 (the “challenged claims”) of the ’067 patent. Paper 2 (“Pet.”). Sage Products, LLC (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). Pursuant to 35 U.S.C. § 314(a), we instituted an *inter partes* review of all challenged claims on all proposed grounds of unpatentability. See Paper 7 (“Dec. to Inst.”), 48.

After institution of trial, Patent Owner filed a Patent Owner Response (Paper 23, “PO Resp.”), to which Petitioner filed a Reply (Paper 28, “Pet. Reply”). Patent Owner then filed a Sur-Reply (Paper 35, “PO Sur-Reply”).

An oral argument was held on October 13, 2022. A transcript of the oral argument is included in the record. Paper 40 (“Tr.”).

### B. *Real Parties in Interest*

Petitioner states “[t]he real party-in-interest for Petitioner is Becton, Dickinson and Company.” Pet. 3. Patent Owner states that “Sage is a wholly-owned subsidiary of Stryker Corporation.” Paper 4 (Patent Owner’s Mandatory Notice), 2. The parties do not raise any issue or provide arguments regarding real parties in interest in this proceeding.



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*C. Related Proceedings*

The parties identify the following district court case involving the '067 patent: *Sage Products, LLC v. Becton, Dickinson and Company*, Case No. 2:20-cv-08000-KMJBC (D. N.J. filed June 30, 2020). Pet. 4; Paper 4, 2. The parties also identify IPR2021-01201 asserted against U.S. Patent No. 10,398,642, which is related to the '067 patent. Pet. 4; Paper 4, 2.

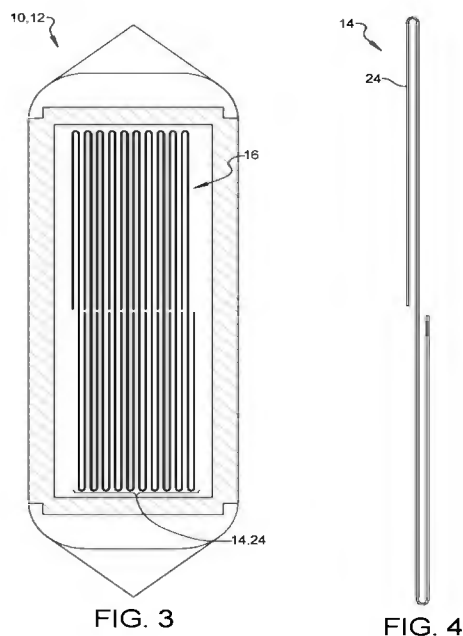
*D. The '067 Patent (Ex. 1001)*

The '067 patent is titled “Sterilized Chlorhexidine Article and Method of Sterilizing a Chlorhexidine Article,” and issued on June 23, 2020. Ex. 1001, codes (45), (54). It is a continuation of U.S. Patent Nos. 10,398,642 and 10,188,598, and relies on a provisional application filed on Nov. 25, 2015. *Id.* at codes (60), (63).

*1. Written Description*

The '067 patent relates to a sterilized chlorhexidine gluconate product that includes (1) a sterilized composition of chlorhexidine gluconate and alcohol, (2) an applicator, and (3) a barrier configured to be compromised to impregnate the applicator with the sterilized chlorhexidine gluconate composition. *Id.* at code (57). One embodiment of the invention is shown in Figures 3 and 4, reproduced below:

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As shown above in Figures 3 and 4, sterilized chlorhexidine product 10 comprises package 12 and chlorhexidine article 14. Ex. 1001, 2:37–40. Package 12 defines interior volume 16, and chlorhexidine article 14 is removably disposed in interior volume 16 of package 12. *Id.* at 2:40–42. The '067 patent discloses that package 12 is particularly suitable for terminal sterilization processes. *Id.* at 2:56–58. The '067 patent explains that “when the chlorhexidine product 10 is subjected to a sterilization process, such as a terminal sterilization process, it will be appreciated that the package 12 is also subjected to the sterilization process in addition to the chlorhexidine article 14 disposed therein.” *Id.* at 17:4–8.

In certain embodiments, the sterilized chlorhexidine article is intended to be used by a patient care provider for disinfecting skin or mucous membranes of a patient. *Id.* at 4:1–3. As shown above in Figure 4, chlorhexidine article 14 comprises applicator 24 and an antiseptic composition. *Id.* at 4:9–10. Applicator 24 facilitates topical application of the antiseptic composition to the skin or mucous membranes of a patient. *Id.*

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at 4:11–13. The '067 patent discloses that “[t]he antiseptic composition comprises one or more antibacterial agents and one or more solvents.” *Id.* at 7:27–28.

The '067 patent provides ranges for each of the components of the antiseptic compositions because such ranges “may refer to the amounts of those components in the sterilized antiseptic compositions or the unsterilized anti-septic compositions.” *Id.* at 14:41–45. The '067 patent discloses that “[b]ecause certain sterilization processes may cause certain components to degrade, the amount of each component in the antiseptic composition may vary from the non-sterile condition to the sterilized condition.” *Id.* at 14:45–48; *see also id.* at 17:19–38 (“When the chlorhexidine article is sterilized, the sterilized antiseptic composition may further comprise degradation impurities. The degradation impurities may be a result of exposing the chlorhexidine article to the sterilization process.”)

The '067 patent states:

It should be appreciated that the present disclosure describes a method of sterilizing a chlorhexidine product to form a sterilized chlorhexidine article. As such, throughout this disclosure, description that accompanies the terms the chlorhexidine article, or components and compositions thereof, may be referred to as the ‘sterilized’ component or composition upon being exposed to suitable processing where such sterility can be validated. By way of nonlimiting example, the sterility of the chlorhexidine article may be validated in accordance with ISO 11137.

*Id.* at 3:58–67. The '067 patent provides examples of sterilizations processes that may be “suitable to sterilize the chlorhexidine article 14 such that the sterility of the chlorhexidine article 14 can be validated.” *Id.* at 16:16–22. Such examples include “heat sterilization, radiation

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sterilization, ethylene oxide gas sterilization, or combinations thereof.” *Id.* at 16:22–25. In one embodiment, “[c]ooling the chlorhexidine product 10 may comprise cooling the chlorhexidine product 10 to a temperature of from -100° C. to 20° C.” *Id.* at 19:30–32.

The ’067 patent then discloses that

The method further comprises sterilizing the chlorhexidine product 10 to form the sterilized chlorhexidine article 14. The chlorhexidine product 10 may be sterilized by any sterilization process such that the sterility of the chlorhexidine article 14 can be verified. In some embodiments, sterilizing the chlorhexidine product 10 comprises irradiating the chlorhexidine product 10 to form a sterilized chlorhexidine article 14.

*Id.* at 21:4–11. The ’067 patent explains that in certain other embodiments, “sterilizing the chlorhexidine product 10 further comprises heat sterilizing the chlorhexidine product 10.” *Id.* at 21:12–14. The ’067 patent then provides another reminder that “[o]f course it should be appreciated that the antibacterial agent of the antiseptic composition may not be compatible with heat sterilization.” *Id.* at 21:14–16.

In addition to cooling, freezing, and heat sterilization, the ’067 patent discloses irradiating “the chlorhexidine product 10 to form the sterilized chlorhexidine article 14.” *Id.* at 21:37–39. The ’067 patent states that the radiation type can include “gamma radiation, electron- beam radiation, x-ray radiation, or combinations thereof” or “electron beam radiation.” *Id.* at 21:39–44. The ’067 patent further discloses that “[t]he chlorhexidine product 10 may be irradiated with the radiation type by any suitable radiation unit.” *Id.* at 21:45–46.

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2. *Illustrative Claims*

As noted previously, Petitioner challenges claims 1–3, 5–8, and 10–19 of the '067 patent, of which claims 1 and 12 are independent. Pet. 6; Ex. 1001, 27:8–28:46. Claim 1 is illustrative and is reproduced below.

1. A sterilized chlorhexidine product for topical disinfection, said sterilized chlorhexidine product comprising:
  - a sterilized chlorhexidine gluconate composition;
  - an applicator for facilitating application of the sterilized chlorhexidine composition; and
  - a barrier configured to be compromised to impregnate the applicator with the sterilized chlorhexidine gluconate composition;wherein the sterilized chlorhexidine gluconate composition comprises chlorhexidine gluconate and alcohol.

Ex. 1001, 27:9–18.

E. *Asserted Challenges to Patentability and Evidence of Record*

Petitioner challenges the patentability of claims 1–3, 5–8, and 10–19 of the '067 patent based on the following references or combination of references:

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Claims Challenged	35 U.S.C. §	Reference(s)/Basis
1–3, 5–8, 10–19	102(a)	ChloraPrep PAR <sup>1</sup>
1–3, 5–8, 10–19	103 <sup>2</sup>	ChloraPrep PAR
1–3, 5–8, 10–19	103	ChloraPrep PAR, Degala <sup>3</sup>

Patent Owner does not dispute that each reference qualifies as prior art. *See, e.g.*, PO Resp. 6–14, 20–44.

In support of its patentability challenge, Petitioner relies on, *inter alia*, the following declarations: (1) the Declaration of Roger Dabbah, Ph.D. (“Dr. Dabbah”) (Ex. 1003); (2) Noble-Clarke (Ex. 1037); (3) Mr. Christopher McGinley (Ex. 1038); and (4) Sean Sheridan, Ph.D. (“Dr. Sheridan”) (Ex. 1039). Additionally, Petitioner submits deposition testimony from William Rutala, Ph.D. (“Dr. Rutala”) (Exs. 1040, 1042). To support its positions, Patent Owner relies on the Declaration of Dr. William Rutala Relating to *Inter Partes* Review of US Patent No. 10,688,067 (Exhibit 2023).

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<sup>1</sup> Medicines and Healthcare products Regulatory Agency, Public Assessment Report, “ChloraPrep with Tint 2% w/v/70%v/v Cutaneous Solution,” archived on November 17, 2010, *available at* <https://webarchive.nationalarchives.gov.uk/ukgwa/20101117020428/http://www.mhra.gov.uk/home/groups/par/documents/websiteresources/con071263.pdf> (“ChloraPrep PAR,” Ex. 1005).

<sup>2</sup> The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), included revisions to 35 U.S.C. § 103 that became effective as of March 16, 2013. The application for the ’642 patent was filed after March 16, 2013, and includes a priority claim to an application filed after this date. Ex. 1001, codes (22), (63). Accordingly, we apply the post-AIA version of 35 U.S.C. § 103.

<sup>3</sup> Degala et al., US 2015/0190535 A1, published Jul. 9, 2015 (“Degala,” Ex. 1007).

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## II. PRELIMINARY MATTERS

### A. Claim Construction

A claim “shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b).” 37 C.F.R. § 42.100(b) (2020). Under that standard, “[c]laim terms are given their ordinary and customary meaning, which is the meaning the term would have to a person of ordinary skill in the art at the time of the invention.” *Power Integrations, Inc. v. Fairchild Semiconductor Int’l, Inc.*, 904 F.3d 965, 971 (Fed. Cir. 2018) (citing *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc)). The meaning of claim terms may be determined by “look[ing] principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

The ordinary and customary meaning of a claim term applies “unless the patentee demonstrated an intent to deviate from [it] . . . by redefining the term or by characterizing the invention in the intrinsic record using words or expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope.” *Teleflex, Inc. v. Ficosa N. America Corp.*, 299 F.3d 1313, 1327 (Fed. Cir. 2002); *see also Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1371 (Fed. Cir. 2014). Additionally, although we “look to the specification and prosecution history to interpret what a patentee meant by a word or phrase in a claim,” we do not read “extraneous limitations . . . into the claims from the specification or prosecution history”

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absent an express definition or clear disavowal of claim scope. *Bayer AG v. Biovail Corp.*, 279 F.3d 1340, 1348 (Fed. Cir. 2002).

In the Petition, Petitioner asserted that all claim terms should receive their “plain and ordinary meaning” and that an express construction of the challenged claims is unnecessary for resolution of this proceeding. Pet. 15–16.

In the Institution Decision, we construed the claim term “sterilized” to mean: “the component or composition has been subjected to a suitable sterilization process such that sterility can be validated.” Dec. to Inst. 23. Patent Owner agrees with this construction. PO Resp. 17–18 (“The Institution Decision correctly construed ‘sterilized’ . . . consistent with its ordinary meaning, the description in the patent, and the meaning to a [person of ordinary skill in the art.]”); Sur-reply 3–4 (same). In its Reply, Petitioner argues that the construction in the Institution Decision “improperly imports a process limitation into apparatus claims, even though the process by which an apparatus is made is irrelevant.” Reply 3. Petitioner also contends that the “use of the word ‘suitable’ [in the Board’s preliminary construction] interjects needless ambiguity into the claims.” *Id.* Thus, Petitioner proposes that the term “sterilized” should be construed to mean “in a sterile condition.” *Id.*

We begin by considering the specification of the ’067 patent. The specification states:

It should be appreciated that the present disclosure describes a method of sterilizing a chlorhexidine product to form a sterilized chlorhexidine article. As such, throughout this disclosure, description that accompanies the terms the chlorhexidine article, or components and compositions thereof, may be referred to as the ‘sterilized’ component or composition



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upon being exposed to suitable processing where such sterility can be validated. By way of non-limiting example, the sterility of the chlorhexidine article may be validated in accordance with ISO 11137.

Ex. 1001, 3:58–67. The specification thus defines the term “sterilized” to mean that the article/component/composition described as sterilized was “exposed to suitable processing where such sterility can be validated.” *See also id.* at 16:26–30 (“In the context of this disclosure, when the chlorhexidine article 14 is sterilized, the components of the chlorhexidine article 14 are in a sterile condition, and that sterile condition has been validated, the resultant article is referred to as a sterilized chlorhexidine article 14”).

During the prosecution of the parent application to the ’067 patent, Patent Owner specifically stated that “for an article or product to have ‘a sterility assurance level’ as required by claim 1, the article/product must first be subjected to a sterilization process.” Ex. 2012, 95. Patent Owner explained:

the “sterility assurance level” of a product is unrelated to the amount of chlorhexidine gluconate (or for that matter, any antimicrobial agent) present in the product. Instead the “sterility assurance level” of a product results from a sterilization process.

*Id.* Patent Owner then distinguished the cited prior art on the basis that “[n]one of the cited references disclose, teach, or even suggest subjecting a chlorohexidine product as recited in the claims to a sterilization process.”

*Id.* Thus, the prosecution history, like the specification, associates the sterility of a product with subjecting that product to a “sterilization process.”

Petitioner argues that our preliminary construction “improperly imports a process limitation into apparatus claims.” Petitioner’s proposed

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construction thus avoids reciting a process step by proposing that “sterilized” means “in a sterile condition.” The Federal Circuit, however, has explained that “process steps can be treated as part of the product claim if the patentee has made clear that the process steps are an essential part of the claimed invention.” *Vectura Ltd. v. Glaxosmithkline LLC*, 981 F.3d 1030, 1038 (Fed. Cir. 2020) (quoting *Continental Circuits LLC v. Intel Corp.*, 915 F.3d 788, 799 (Fed. Cir. 2019)).

Here, as discussed above, the specification and prosecution history make clear that being subjected to a sterilization process is an essential part of the claimed invention. Because the case law makes clear that process steps can be part of a product claim, and because our preliminary claim construction is more closely aligned with the language used in the specification and in the prosecution history than the language proposed by Petitioner, we maintain our preliminary claim construction. Accordingly, we construe “sterilized” to mean that the article/component/ composition recited as “sterilized” has been subjected to a suitable sterilization process such that sterility can be validated.

#### *B. Principles of Law*

A claim is unpatentable under 35 U.S.C. § 102 if a prior art reference discloses every limitation of the claimed invention, either explicitly or inherently. *Glaxo Inc. v. Novopharm Ltd.*, 52 F.3d 1043, 1047 (Fed. Cir. 1995). Furthermore, the prior art reference—in order to anticipate under 35 U.S.C. § 102—must lead to a composition that falls within the scope of the claim “without *any* need for picking, choosing, and combining various disclosures not directly related to each other by the teachings of the cited reference.” *In re Arkley*, 455 F.2d 586, 587 (CCPA 1972). Thus, it is not

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enough that the prior art reference discloses multiple, distinct teachings that the artisan might somehow combine to achieve the claimed invention. *See Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1371–72 (Fed. Cir. 2008) (finding a prior art reference is anticipatory only if the reference discloses every limitation of the claimed invention arranged or combined in the same way as in the claim). “However, a reference can anticipate a claim even if it ‘d[oes] not expressly spell out’ all the limitations arranged or combined as in the claim, if a person of skill in the art, reading the reference, would ‘at once envisage’ the claimed arrangement or combination.” *Kennametal, Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376, 1381 (Fed. Cir. 2015) (quoting *In re Petering*, 301 F.2d 676, 681 (CCPA 1962)) (alteration in original). Specifically, a “reference may still anticipate if that reference teaches that the disclosed components or functionalities may be combined and one of skill in the art would be able to implement the combination.” *Blue Calypso, LLC, v. Groupon, Inc.*, 815 F.3d 1331, 1341–1344 (Fed. Cir. 2016); *see Bristol-Myers Squibb Co. v. Ben Venue Labs., Inc.*, 246 F.3d 1368, 1379 (Fed. Cir. 2001).

In order to anticipate “a prior art reference must disclose all elements . . . within the four corners of the document.” *Microsoft v. Biscotti*, 878 F.3d 1052, 1068 (Fed. Cir. 2017). Nonetheless, “[e]xtrinsic evidence ‘may be used to interpret the allegedly anticipating reference and [to] shed light on what it would have meant to a [PHOSITA].’” *Monsanto Technology LLC v. EI DuPont de Nemours and Company*, 878 F.3d 1336, 1345 (Fed. Cir. 2018) (quoting *Ciba-Geigy Corp. v. Alza Corp.*, 68 F.3d 487 (Fed. Cir. 1995)).

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A claim is unpatentable under 35 U.S.C. § 103 if “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, objective evidence of non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). When evaluating a combination of teachings, we must also “determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). Whether a combination of prior art elements would have produced a predictable result weighs in the ultimate determination of obviousness. *Id.* at 416–417.

We analyze the challenges presented in the Petition in accordance with the above-stated principles.

### *C. Burden of Proof*

In an *inter partes* review, the petitioner must show with particularity why each challenged claim is unpatentable. *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016); 37 C.F.R. § 42.104(b). The burden of persuasion never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

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*D. Level of Ordinary Skill in the Art*

Factors pertinent to determining the level of ordinary skill in the art include (1) the educational level of the inventor; (2) the type of problems encountered in the art; (3) prior-art solutions to those problems; (4) the rapidity with which innovations are made; (5) the sophistication of the technology; and (6) the educational level of workers active in the field. *Envtl. Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696–97 (Fed. Cir. 1983). Not all factors may exist in every case, and one or more of these or other factors may predominate in a particular case. *Id.* These factors are not exhaustive, but merely a guide to determining the level of ordinary skill in the art. *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007). Moreover, the prior art itself may reflect an appropriate skill level. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

Petitioner contends that a person of ordinary skill in the art at the critical time would have possessed “at least an undergraduate degree in the pharmaceutical sciences, pharmacy, biochemistry, microbiology, or a related field, and a Masters in a similar field and at least 6 years industry experience or a Ph.D. in a similar field and at least 4 years industry experience in the field developing sterilization processes, sterile medical devices and/or formulations or tests for evaluating sterility.” Pet. 15.

Patent Owner does not expressly offer its own definition of a person of ordinary skill in the art, but agrees with the definition we provided in our Institution Decision. Ex. 2023 ¶¶ 141–143 (Dr. Rutala agreeing with the definition provided in our Institution Decision); PO Resp. 15 (citing Dr. Rutala’s testimony). The Institution Decision defined the person of ordinary skill as follows:

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[A] person of ordinary skill in the art at the time of the invention would have possessed at least an undergraduate degree in the pharmaceutical sciences, pharmacy, biochemistry, microbiology, or a related field, with experience with sterilization processes for medical products and their components, as well as familiarity with antiseptics such as chlorhexidine.

Inst. Dec. 19. Dr. Rutala adds one caveat – that the person of ordinary skill in the art would have had at least four years of relevant experience.

Ex. 2023 ¶ 143.

As to Petitioner’s proposed definition, Patent Owner contends that Petitioner’s proposal “is disconnected from the disclosure of the 067 Patent as it requires no experience with antiseptics or chlorhexidine, but only a general awareness of ‘sterilization processes, sterile medical devices and/or formulations or tests for evaluating sterility.’” PO Resp. 15 (citing Pet. 15). Patent Owner argues that “Petitioner also inflated the educational requirements to a Master’s or PhD, but its expert conceded that only a Bachelor’s was required.” *Id.* (citing Ex. 2024, 42:10–15, 40:10–19). Although Patent Owner asserts that it prevails under either proposed skill level, it nonetheless argues that the definition of a person of ordinary skill in the art is important because a person of ordinary skill in the art “with familiarity with antiseptics and chlorhexidine and would be aware of the challenges facing practitioners.” *Id.* at 15–16.

Patent Owner further contends “Dr. Dabbah is not a [person of ordinary skill in the art] and cannot adequately opine on what was known or obvious to a [person of ordinary skill in the art] about developing sterilized chlorhexidine product/articles.” *Id.* at 16. Patent Owner concedes Dr. Dabbah is knowledgeable about sterilization generally, but argues that

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Dr. Dabbah has no experience with antiseptics or CHG specifically, and therefore, cannot opine credibly as a person of ordinary skill in the art so his testimony should be disregarded. *Id.* at 17 (citing *Kyocera Senco Indus. Tools Inc. v. ITC*, 22 F.4th 1369, 1377–78 (Fed. Cir. 2022); *Flex-Rest, LLC v. Steelcase, Inc.*, 455 F.3d 1351, 1360-61 (Fed. Cir. 2006); *Schott Gemtron Corp. v. SSW Holding Co.*, IPR2013-00358, 2014 WL 4181969, at \*10 (PTAB Aug 20, 2014) (Paper 106) (“[W]e accord the testimony . . . regarding the alleged obviousness of the claims less weight because he was not a [POSA] . . . .”); *see also* Tr. 39:1–13 (“And I’ll point out to you the fact that [Dr. Dabbah] had never read any articles about chlorhexidine gluconate prior to this case. He never even heard of ChloraPrep prior to this case. So, how [h]e could opine about how it was so obvious to sterilize chlorhexidine gluconate. You know, I think that testimony is not provided.”). According to Patent Owner, its own witness, Dr. Rutala, in contrast is a person of ordinary skill in the art and a “well-recognized expert on antiseptics including CHG and sterilization processing.” *Id.* at 17 (citing Ex. 2023 ¶¶ 5–24; Ex. 2005, 4.)

Based on the entirety of the record, we determine that a person of ordinary skill in the art at the time of the invention would have possessed at least an undergraduate Bachelor’s degree in the pharmaceutical sciences, pharmacy, biochemistry, microbiology, or a related field, with at least four years of experience with sterilization processes for medical products and their components, as well as familiarity with antiseptics such as chlorhexidine. Such level of skill in the art is consistent with the ’067 patent and the asserted prior art of record.

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Regarding Patent Owner's arguments that Dr. Dabbah is not a person of ordinary skill in the art and cannot adequately opine on what was known or obvious to a person of ordinary skill in the art about developing sterilized chlorhexidine product/articles, we first note Patent Owner did not file a Motion to Exclude Dr. Dabbah's testimony. *See* Tr. 39:19–26. As to Dr. Dabbah's qualifications, there can be no dispute that Dr. Dabbah meets the educational requirements set forth in our definition. Dr. Dabbah received a Bachelor's degree in Microbiology and Chemistry, a Masters in Dairy Microbiology, and a Ph.D. in Food Sciences and Biochemistry. Ex. 1003 ¶ 6. Nor can there be a reasonable dispute that Dr. Dabbah has at least four years of experience with sterilization processes for medical products and their components, as well as familiarity with antiseptics. *See* Ex. 1003 ¶¶ 6–17, 70, Appendix A (Dr. Dabbah's CV); Ex. 2024, 18:18–20:23 (Dr. Dabbah testifying regarding his educational and work experience, specifically that he had experience with “sterilization of . . . infant formula to validation of the process used in sterilization of those Similac products”), 22:22–23:16 (Dr. Dabbah testifying that he was personally involved in the steam and Eto sterilization processes for several products including medical devices); 37:19–38:1 (Dr. Dabbah testimony rejecting assertion that he lacked experience with antiseptics); 53:4–54:12 (Dr. Dabbah testifying regarding his familiarity with antiseptics). Accordingly, on this record as a whole, we do not agree with Patent Owner's position. Rather, we determine Dr. Dabbah qualifies as at least a person of ordinary skill in the art. Thus, we will consider his testimony in this proceeding.



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*E. Overview of Asserted Prior Art*

*1. Overview of ChloroPrep PAR (Exs. 1004, 1005)*

ChloroPrep PAR is a Public Assessment Report for “ChloroPrep with Tint 2% w/v/70%v/v Cutaneous Solution,” authored by the United Kingdom Medicines and Healthcare products Regulatory Agency (“MHRA”).<sup>4</sup>

Ex. 1005, 1. ChloroPrep PAR discloses that:

The Medicines and Healthcare products Regulatory Agency (MHRA) granted Enturia Limited a Marketing Authorisation (licence) for the medicinal product ChloroPrep® with Tint 2%w/v/70%v/v Cutaneous Solution (PL 31760/0001. This is a general sales medicine (GSL) and is used to disinfect the skin and help prevent infections before invasive medical procedures such as injections, insertion of catheters and minor or major surgery.

Ex. 1005, 2.

ChloroPrep PAR begins with a “Lay Summary,” which states that the ChloroPrep product “contains the active ingredients chlorhexidine gluconate 2%w/v and isopropyl alcohol 70% v/v” and goes on to state that

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<sup>4</sup> According to Petitioner:

The UK MHRA is responsible for, *inter alia*, evaluating marketing authorization applications for drug products, and provides the basis for the authorization of medicines in the United Kingdom. Ex. 1020. In connection with this regulatory function, the MHRA publishes Public Assessment Reports (“PARs”), which include, Summaries of Product Characteristics (“SPCs”) and Product Information Leaflets (“PILs”). These regulatory reports are published to memorialize the authorization of pharmaceutical drugs and medical devices and disclose the MHRA’s reasoning and approval process.




Pet. 17.

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“[t]his is a new combination of two well-known antiseptic agents.”

Ex. 1005, 2. According to Chloraprep PAR, “[t]he rationale for development of a fixed combination product containing 2% chlorhexidine gluconate and 70% isopropyl alcohol was to develop an antiseptic with rapid onset and long lasting activity against potential pathogens.” *Id.*

Chloraprep PAR contains a figure within the section titled “Summary of Product Characteristics” (“SPC”) (*id.* at 5–8) that depicts three different forms of applicators for the Chloraprep product each dispensing a different volume of the chlorhexidine gluconate/isopropyl alcohol solution. *Id.* at 5. The figure is reproduced below:

Applicator	Maximum Coverage Area (cm x cm)	For Procedures such as:
3 ml 	15 x 15	<ul style="list-style-type: none"> <li>- Midline &amp; Central Venous Catheter (CVC) insertion and maintenance</li> <li>- Peritoneal dialysis site cleansing</li> </ul>
10.5 ml 	25 x 30	<ul style="list-style-type: none"> <li>- Minor and major surgical procedures</li> <li>- Implantable device placement</li> <li>- Prosthetic device placement or removal</li> <li>- Midline, Peripheral Intravascular Central Catheter (PICC) &amp; CVC insertion and maintenance</li> </ul>
26 ml 	50 x 50	<ul style="list-style-type: none"> <li>- Cardiac catheterisation and Cardiac Cath Lab procedures</li> <li>- Interventional Radiology procedure</li> </ul>

*Id.* The above figure is a table in which the left column identifies three sizes of applicators, the middle column identifies the “Maximum Coverage Area” for each size of applicator, and the right column identifies procedures in which the differently sized applicators can be used. *Id.* The three sizes of applicator are 3 ml, 10.5 ml, and 26 ml. *Id.* “The 3 ml and 10.5 ml

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applicators each have a single glass ampoule within the plastic barrel. The 26 ml applicator holds two 13 ml glass ampoules.” *Id.* at 7. ChloraPrep PAR states that “[t]he applicator is removed from the wrapper and held with the sponge facing downward. The applicator is squeezed gently to break the ampoule containing the antiseptic solution, which is released onto the sponge in a controlled flow.” *Id.* at 5.

ChloraPrep PAR discloses that the pharmaceutical composition contains 20mg/ml of chlorhexidine gluconate and 0.70ml/ml of isopropyl alcohol as well as the excipient, “Sunset Yellow.” *Id.* at 5, 7. According to ChloraPrep PAR, “ChloraPrep with Tint is a sterile alcoholic antiseptic solution” in which “[t]he sterile applicators are individually packaged in an ethyl vinyl acetate film.” *Id.* at 7. ChloraPrep PAR instructs users to “[s]tore in the original packaging; applicator is sterile unless seal is broken.” *Id.*

ChloraPrep PAR also includes the Product Information Leaflet (“PIL”) for the product, which describes the CHG composition as a “sterile alcoholic antiseptic solution containing chlorhexidine gluconate and isopropyl alcohol in an applicator” as shown in the figure reproduced below:

**6. FURTHER INFORMATION**  
**What ChloraPrep contains**  
The active substances are chlorhexidine gluconate 20mg/ml and isopropyl alcohol 0.70ml/ml. The other ingredients are purified water and Sunset Yellow (E110).

**What ChloraPrep looks like and contents of the pack**  
ChloraPrep with Tint is a sterile alcoholic antiseptic solution containing chlorhexidine gluconate and isopropyl alcohol in an applicator. The applicators consist of a latex-free sponge attached to a plastic handle/barrel which holds a latex-free dyed pledget and glass ampoule containing the antiseptic solution. The 3ml and 10.5ml applicators each have a single glass ampoule within the plastic barrel. The 26ml applicator holds two 13ml glass ampoules. The sterile applicators are individually packaged in an ethyl vinyl acetate film.

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Ex. 1005, 10. The Figure reproduced above is an excerpt from the product packaging describing “[w]hat ChlorPrep contains,” “[w]hat ChlorPrep looks like,” and the “contents of the pack.” *Id.*

2. *Degala (Ex. 1007)*

Degala is a U.S. Patent Application Publication titled “System, Methods, and Devices for Sterilizing Antiseptic Solutions” that published on July 9, 2015 and was filed on January 8, 2014. Ex. 1007, codes (22), (43), (54). Degala is directed to a method for sterilizing a topical antiseptic solution of chlorhexidine, including chlorhexidine gluconate. *Id.* ¶¶ 22, 30. Degala further discloses that the antiseptic solution may contain an alcoholic solvent. *Id.* ¶ 28.

Degala discloses the state of both the prior art methods and regulatory schemes requiring sterilization of antiseptic solutions, specifically discloses:

In the United States there are currently no regulations regarding the sterilization requirements of topical antiseptic solutions. Therefore, antiseptic solutions currently sold in the United States generally do not undergo a sterilization process. In other jurisdictions, however, such as European Union (EU) countries, some degree of sterilization is required. . . .

The known method of sterilization involves heat treating glass ampoules containing the chlorhexidine gluconate solution in a convection oven at 76–80° C. for 24–31 hours. It is currently believed that relatively low temperature and relatively long processing time is necessary to sufficiently sterilize the solution without overly degrading the antimicrobial molecules, thereby avoiding reducing the concentration and purity of the chlorhexidine gluconate contained therein as an antiseptic.

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*Id.* ¶¶ 2–3. Degala further discloses that “[i]t is the industry belief that high temperature sterilization is not suitable due to the expected degradation.” *Id.* ¶ 4.

In order to “address the unmet need in the art for a method of sterilizing antiseptic solutions” (*id.* ¶ 5), in one embodiment, Degala teaches a method for sterilizing an antiseptic solution comprising:

heating the antiseptic solution to the selected sterilization temperature; maintaining the antiseptic solution at the selected sterilization temperature for the selected sterilization time; and terminating the heating of the antiseptic solution when the selected sterilization time expires. After terminating the heating, the antiseptic solution has a post-sterilization purity.

*Id.* ¶ 7. Degala teaches further discloses “by selecting an appropriate combination of sterilization temperature and sterilization time, the post-sterilization purity may be maintained relatively close to the initial purity, while still being sterile.” *Id.* ¶ 39.

### III. ANALYSIS

#### A. *Alleged Anticipation of Claims 1–3, 5–8, and 10–19 by ChloraPrep PAR*

Petitioner asserts that claims 1–3, 5–8, and 10–19 are unpatentable as anticipated by the ChloraPrep PAR. Pet. 26–51. Patent Owner disagrees, arguing, *inter alia*, that ChloraPrep PAR does not disclose any of the elements recited in the independent claims. PO Resp. 20–38. Patent Owner also offers arguments with respect to the additional limitations recited in several of the dependent claims. *Id.* at 31–36. And Patent Owner argues that the ChloraPrep PAR does not anticipate the challenged claims because it is not enabling. *Id.* at 36–38. For the reasons discussed below, Petitioner

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has established by a preponderance of the evidence that the ChloraPrep PAR anticipates claims 1–3, 5–8, and 10–19 of the '067 patent.

*1. Analysis of Independent Claim 1*

*a) preamble “a sterilized chlorhexidine product for topical disinfection, said sterilized chlorhexidine product comprising”*

Claim 1 recites as its preamble “a sterilized chlorhexidine product for topical disinfection.” Ex. 1001, 27:9–10. Petitioner contends that, to the extent the preamble is limiting, the ChloraPrep PAR discloses the elements of the preamble. Pet. 26–27. More specifically, Petitioner contends that “[t]he sterile applicators and sterile CHG and isopropyl alcohol solution form a sterilized chlorhexidine product.” *Id.* at 28. As support, Petitioner points to the Product Information Leaflet (“PIL”) included in the ChloraPrep PAR, which “states that the ‘[t]he sterile applicators are individually packaged in an ethyl vinyl acetate film.’” *Id.* at 27–28. According to Petitioner, a skilled artisan would know that ethyl vinyl acetate “is a common material used in medical packaging to ensure that the contents of the packaging remain sterile.” *Id.* at 27 (citing Ex. 1005, 10, Ex. 1035 ¶¶ 11–13). Petitioner then argues that the statement in the ChloraPrep PAR that the “applicator is sterile unless seal is broken” confirms that the purpose of the ethyl vinyl acetate is to keep the contents of the packaging sterile. *Id.* (citing Ex. 1005, 7); *see also id.* (quoting the statement in ChloraPrep PAR that “ChloraPrep with Tint . . . is sterile until the packaging is opened”).

Patent Owner acknowledges the statements in the ChloraPrep PAR teaching that the CHG solution and the applicator are sterile, but argues that these statements “describe the solution (limitation 1.a) and the applicator (limitation 1.b), not the product that comprises them and a [person of

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ordinary skill in the art] would not understand [them] to teach that the product itself is sterilized.” PO Resp. 24. Patent Owner disputes Petitioner’s assertion that both “[t]he sterile applicators and sterile CHG . . . solution form a sterilized chlorhexidine product,” arguing that “this combination does not establish that the product itself is sterile or sterilized.” *Id.* at 24–25. Patent Owner also cites a Chloraprep Frequently Asked Questions document (“the FAQ”) from 2015 addressing questions regarding Petitioner’s Chloraprep label change, which Patent Owner contends “proves” that there is a distinction between a sterilized product and a sterilized component of that product. *Id.* at 25 (citing statement in Ex. 2006 that “though all Chloraprep applicators are sterilized . . . , the solution inside . . . is not sterile.”). Finally, Patent Owner argues that “Petitioner does not explain how the PAR discloses that its sterilization process can be validated,” as required by the Board’s claim construction. *Id.*

For the reasons discussed below, Petitioner has established by a preponderance of the evidence that the Chloraprep PAR discloses “a sterilized chlorhexidine product for topical disinfection.”<sup>5</sup> We do not agree with Patent Owner’s arguments to the contrary.

We begin our analysis by considering the disclosure of the Chloraprep PAR itself. The Chloraprep PAR states: “Chloraprep with Tint is for single use only and is sterile until the packaging is opened.” Ex. 1005, 10. The Chloraprep PAR defines “Chloraprep with Tint” as “a sterile alcoholic antiseptic solution . . . in an applicator.” *Id.* at 7. It then defines the

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<sup>5</sup> We do not determine whether the preamble is limiting because, regardless of whether the preamble is limiting, Petitioner has shown that the recitation in the preamble is satisfied by the prior art.

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applicator as consisting of “a latex-free sponge attached to a plastic handle/barrel which holds a latex-free dyed pledget and glass ampoule containing the antiseptic solution” – i.e. the entire product other than the antiseptic solution. *Id.* Thus, the ChloraPrep PAR defines “ChloraPrep with Tint” as being the entire product (applicator plus antiseptic solution). *Id.* In addition, “ChloraPrep with Tint” is the name of the product described in the ChloraPrep PAR. *Id.* at 1 (identifying the product as “ChloraPrep with Tint 2% w/v/70% v/v Cutaneous Solution”), 10 (teaching that “[t]his medicinal product is “authorised in the Member States of the EEA under the following names: . . . UK – ChloraPrep with Tint”). For these reasons, we find that a person of ordinary skill in the art would have understood the phrase “ChloraPrep with Tint” as used in the ChloraPrep PAR to refer to the entire product. Thus, based on the disclosure of the ChloraPrep PAR, a person of ordinary skill in the art would have understood “ChloraPrep with Tint . . . is sterile until the packaging is opened,” to mean that the entire product is sterile until the package is open.

This finding is supported by the teaching that ChloraPrep is “packaged in an ethyl vinyl acetate film.” *Id.* In this regard, we credit the testimony of Dr. Dabbah that a person of ordinary skill in the art would know that ethyl vinyl acetate “is a common material used in medical packaging to ensure that the contents of the package remain sterile.” Ex. 1003 ¶ 94.

Our finding that the entire ChloraPrep with Tint product has been sterilized is supported further by what Chiang<sup>6</sup> teaches was known about the

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<sup>6</sup> Chiang et al., U.S. Patent Publication No. 2014/0371695 A1, published Dec. 18, 2014 (“Chiang,” Ex. 2015).



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“ChloroPrep® applicator, provided by CareFusion.” Chiang teaches that it is necessary to sterilize the exterior of the applicator for skin antiseptic applicator devices, but that doing so may compromise the antiseptic solution. Chiang explains:

One of the challenges associated with using such skin antiseptic compositions is the need to sterilize the exterior of the applicator while minimizing potential byproducts that may be produced when the composition is exposed to sterilization compounds such as ethylene oxide gas. Reactive sterilants such as ethylene oxide may react with the active antimicrobial agent or with other components in the skin antiseptic composition, altering the potency or producing potentially toxic compounds.

Ex. 2015 ¶ 9.

Chiang teaches that “ChloroPrep® applicator, provided by CareFusion” solves this problem by using a glass ampule to protect its antiseptic from the ethylene oxide gas used during the sterilization process:

To address this problem, various solutions have been proposed. For example, the ChloroPrep® applicator, provided by CareFusion, has the active skin antiseptic composition, containing chlorhexidine gluconate (CHG), stored in a breakable glass ampule inside the applicator device. In the ChloroPrep® applicator, the sealed glass ampule protects the CHG composition during the sterilization process from ethylene oxide penetration which could otherwise compromise the efficacy of the antiseptic composition. CareFusion has a number of patents and patent applications including: U.S. Pat. Nos. 5,772,346 and 5,752,363 and U.S. Application Publication No. 2012/003029. Each of these teach the use of a sealed glass ampule containing CHG inside a skin antiseptic applicator.

*Id.* ¶ 10. Thus, Chiang teaches that the ChloroPrep® applicator uses a glass ampule to protect CHG from the ethylene oxide used to sterilize the exterior of the applicator.

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Chiang’s disclosure is consistent with Dr. Rutala’s testimony on terminal sterilization. “Terminal sterilization” is a common process where a product is placed “in some type of packaging such that the sterilant permeates and sterilizes the internal item, but the packaging prevents microorganisms from contaminating that internal item.” Ex. 1040, 190:6–20 (Dr. Rutala’s testimony). According to Dr. Rutala, one way to conduct terminal sterilization is using ethylene oxide in conjunction with a gas-permeable packaging. *Id.* at 141:18–143:6; *see also* 147:10–11 (“[A]s I alluded to, ethylene oxide is a sterilization process.”). Furthermore, Dr. Rutala explains that “most plastics are permeable” and “it is not a far stretch to believe that ethylene oxide permeates and is permeable to . . . ethylene-vinyl acetate.” *Id.* at 145:2–147:21.

We find that the disclosure of Chiang reflects the knowledge of a person of ordinary skill in the art at the time of the alleged invention. *See* Ex. 2023 ¶ 206 (testimony of Dr. Rutala that “Chiang set forth the prevailing knowledge that ‘In the ChloraPrep® applicator, the sealed glass ampule protects the CHG composition during the sterilization process from ethylene oxide penetration which would otherwise compromise the efficacy of the antiseptic composition”); *see also* Ex. 1003 ¶ 138 (testimony of Dr. Dabbah that “sterilization of the applicator via ETO and other sterilization processes was a well-known and routine process for a POSA”). Chiang thus reinforces our finding that the ChloraPrep PAR discloses sterilization of the entire ChloraPrep with Tint product by teaching how that sterilization is achieved: by using the combination of ETO and ethylene vinyl acetate (“EVA”) to sterilize the applicator, while relying on the glass ampule to protect the CHG from degradation caused by the ETO.

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Patent Owner does not specifically discuss Chiang, but argues that Petitioner “manufactures a new theory that the PAR discloses ‘the entire product is sterile’ because ‘a POSA would understand . . . that . . . ethyl [sic] oxide gas (‘ETO’)’ would penetrate ‘EVA film’ packaging.” Sur-reply 9. According to Patent Owner, “the Petition never asserted the ‘entire product’ was sterile (only the applicator and solution).” *Id.* We do not agree.

The Petition directs us to the teaching in the ChloraPrep PAR that “ChloraPrep with Tint . . . is sterile until the packaging is opened” as well as the teaching that the applicators are “individually packaged in an ethyl vinyl acetate film.” Pet. 27. The Petition also asserts that ethyl vinyl acetate is “a common material used in medical packaging to ensure that the contents of the package remain sterile.” *Id.* at 28. From this, we understand the Petition to assert that everything contained in ChloraPrep PAR’s ethyl vinyl acetate packaging – i.e., the entire ChloraPrep with Tint product – had been sterilized. As to the use of ethylene oxide gas to achieve sterilization, in arguing that ChloraPrep PAR was enabled, the Petition asserts that “sterilization of the applicator via, for instance, ETO was a well-known and routine process.” *Id.* at 51.

We now consider how a person of ordinary skill in the art at the critical time would have understood the term “sterile” as used in the ChloraPrep PAR. The evidence of record supports that a person of ordinary skill in the art would understand the term “sterile” as used in a U.K. regulatory document, like the ChloraPrep PAR, to mean “sterilized,” as we have construed that term here. Ex. 1003 ¶ 91 (Dr. Dabbah testimony that “using the term ‘sterile’ [in] a regulatory approval of a medical device means unequivocally that the product has been sterilized”). We credit the

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testimony of Dr. Dabbah, who explains, “[t]he use of the term sterile in that strict regulatory context is a term with a precise meaning.” Ex. 1003 ¶ 130.<sup>7</sup> According to Dr. Dabbah, a person of ordinary skill in the art would have understood the term “sterile” in a regulatory document to “unequivocally disclose[] a SAL [sterility assurance level]<sup>8</sup> from  $10^{-3}$  to  $10^{-9}$  to a POSA.” *Id.* That is because BS EN-556-1, the applicable regulatory standard, “specifies a probability of a viable microorganism on a device of  $10^{-6}$  or less (e.g.  $10^{-7}$ , et seq.) which must be achieved in order to designate a terminally sterilized medical device as ‘sterile,’ particularly in such a regulatory document.” *Id.* ¶ 131; Ex. 1017, 8 (BS EN 556-1, stating: “For a terminally-sterilized *medical device* to be designated “*STERILE*”, the theoretical probability of there being a viable micro-organism present on/in the device shall be equal to or less than  $1 \times 10^{-6}$ .”). We credit Dr. Dabbah’s testimony (Ex. 1003 ¶¶ 91, 129–134) and find that a person of ordinary skill in the art would have understood that the product described in the ChloraPrep PAR was required to comply with applicable standards, including BS EN-556-1, and thus a person of ordinary skill in the art would have understood the term “sterile” as used in the ChloraPrep PAR to require a SAL of  $10^{-6}$ .

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<sup>7</sup> Dr. Dabbah’s testimony at paragraphs 129–134 addresses limitations in dependent claims 10 and 20 requiring a particular sterility assurance level. Both claims remain at issue, requiring us to consider the testimony. Although not necessary to support our factual findings with respect to claim 1, we find it helpful to consider and discuss this testimony here as it relates directly to, and further supports, our findings. For completeness, and because they also relate directly to our findings with respect to claim 1, we also consider and discuss here, the arguments made by Patent Owner in response to this testimony.

<sup>8</sup> A “sterility assurance level” or “SAL” refers to “[t]he probability of survival of a single microorganism.” Ex. 1003 ¶ 132.

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Patent Owner seeks to undermine the argument that a person of ordinary skill in the art would have understood that the product described in the ChloraPrep PAR needed to comply with applicable regulations by arguing that “Petitioner’s declarants conceded that ‘ChloraPrep is regulated as a medicinal product’ and did not know if BS EN 556-1 was followed.” Sur-reply 15. We find these arguments misleading and unpersuasive.

Patent Owner is correct that Petitioner’s declarants, Messrs. Noble-Clark and McGinley, testified that ChloraPrep is regulated as a medicinal product. Ex. 2044, 40:1–7; Ex. 2045, 44:1–6. But that does not preclude that ChloraPrep was also regulated as a medical device. Indeed, Mr. McGinley testified that ChloraPrep was subject to multiple sets of regulations:

As part of my work, I am aware of the British Standard corresponding to EN556-1, which establishes the requirements for labeling a medical device as “STERILE.” I understand from my work that during the initial discussions for licensing the ChloraPrep UK products that the MHRA required that the ChloraPrep UK products, including the CHG solution, be sterilized to a SAL of  $10^{-6}$ , ***consistent with the requirements of the EC Guidelines of Good Manufacturing Practice (1990) and the Ph. Eur 5.1.1*** (copies of which are attached as Exs. 1048-1049 from BD’s files) ***which apply to medicinal products, as well as EN556-1, which was used to validate the sterility of the complete device.***

Ex. 1038 ¶ 16 (emphasis added). Accordingly, the testimony of Petitioner’s declarants that ChloraPrep was regulated as a medicinal product supports a finding that BS EN 556-1 was applicable to ChloraPrep with Tint, particularly when considered together with the repeated testimony from multiple sources to the same effect. *See e.g., id.*; Ex. 1037 ¶ 4; Ex. 1003 ¶ 131.

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As to Patent Owner’s argument that Petitioner’s declarant was unaware whether BS EN 556-1 was followed, we find Patent Owner to have unfairly interpreted Mr. McGinley’s deposition testimony. Mr. McGinley was asked: “Do you know whether compliance with British Standard EN556-1 is documented anywhere in the dossier application for ChloraPrep with Tint?” And he responded: “Sitting here right now, I’m not in a position to say whether that specific reference was included within the dossier itself.” Ex. 2045, 118:8–14 (cited at Sur-reply 15). Being unable to say whether compliance with BS EN 556-1 was documented in a particular dossier is a far cry from being unable to say whether BS EN 556-1 was “followed.” Moreover, in his declaration, Mr. McGinley unequivocally testified that ChloraPrep with Tint was sterilized in a manner “consistent” with BS EN 556-1. Ex. 1038 ¶ 16. Particularly in view of this declaration testimony, we find Patent Owner’s interpretation of Mr. McGinley’s deposition testimony unhelpful and unpersuasive.

Patent Owner also raises three arguments in connection with dependent claims 10 and 20 that warrant consideration here because they relate to whether BS EN 556-1 applies to the ChloraPrep PAR. First, Patent Owner argues: “Petitioner provides no evidence that any ‘British Standard’ . . . – including BSEN556-1 directed to ‘medical devices’ – governs the use of the term ‘sterile’ in a PAR relating to topical CHG products. PO Resp. 34. Patent Owner notes that the British Standard Institution (“BSI”)<sup>9</sup> states that its “[s]tandards are voluntary in that they are tools devised for the

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<sup>9</sup> According to Dr. Rutala, BSI is the organization that publishes the British Standards, which include BS EN 556-1. Ex. 2023 ¶ 288.

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convenience of those who wish to use them.” *Id.* at 34–35 (citing Ex. 2037; Ex. 2038; Ex. 2023 ¶¶ 287–292). We do not agree with this argument.

Petitioner provides the testimony of multiple witnesses whose testimony supports that BS EN 556-1 applied to the ChloroPrep PAR and that compliance with that standard was “required.” Ex. 1038 ¶ 16 (testimony of Mr. McGinley); Ex. 1037 ¶ 4 (Noble-Clarke testimony); Ex. 1003 ¶ 131 (testimony of Dr. Dabbah). And BS EN 556–1 itself repeatedly uses mandatory language in connection with its sterilization standards. *See, e.g.*, Ex. 1017, 1 (“Sterilization of medical devices – **Requirements** for medical devices to be designated ‘STERILE’”; “Part 1: **Requirements** for terminally sterilized medical devices”), 3 (same), 6 (“European Standards for *medical devices require*, when it is necessary to supply a *sterile* product item, that adventitious microbiological contamination of a *medical device* from all sources is minimized by all practical means”; “This European Standard specifies the **requirements** for a terminally-sterilized *medical device* to be designated ‘*STERILE*.’), 8 (section heading “**Requirements**” setting forth the standard that “For a terminally-sterilized medical device to be designated “STERILE”, the theoretical probability of there being a viable micro-organism present on/in the device **shall be** equal to or less than  $1 \times 10^{-6}$ .”) (bolded emphasis added).

We recognize that the British Standards Institution website states that the “[s]tandards are voluntary in that they are tools devised for the convenience of those who wish to use them.” Ex. 2037. We also acknowledge Dr. Rutala’s opinion that Dr. Dabbah has not shown that the ChloroPrep PAR was required to comply with BS EN 556-1. Ex. 2023 ¶ 292. To the extent this evidence conflicts with the evidence provided by

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Petitioner that compliance was required, we find Petitioner’s evidence more persuasive. In this regard, we credit the testimony Dr. Dabbah, and Messrs. Noble-Clarke and McGinley as well as the evidence provided by BS EN 556-1 itself over the evidence provided by Patent Owner on this topic.

Second, Patent Owner argues that BS EN 556-1 “defines ‘Medical Device’ to exclude products that ‘achieve [their] principal intended action in or on the human body by pharmacological . . . means.’” PO Resp. at 35. Patent Owner also argues that the ChloraPrep PAR “identifies ChloraPrep as a ‘medicinal product’ – not a ‘medical device.’” *Id.* (internal citation to Ex. 1005, 2 omitted). And Patent Owner argues that the MHRA classifies chlorhexidine topical antiseptics as ‘medicinal products’ – not ‘medical devices.’” *Id.* (citing Ex. 2039, 48–50; Ex. 2023 ¶¶ 296–297). We do not find these arguments compelling.

As discussed above, multiple witnesses testify that BS EN 556-1 applied to the ChloraPrep PAR. We credit these witnesses over Patent Owner’s interpretation of BS EN 556-1. Moreover, we do not read BS EN 556-1 to exclude the ChloraPrep PAR. Although Patent Owner is correct that BS EN 556-1 defines “medical device” to exclude devices that “achieve [their] principal intended action in or on the human body by pharmacological, immunological or metabolic means,” BS EN 556-1 expressly includes within its definition, devices which are “assisted in [their] function by such means.” Ex. 1017, 7. To the extent ChloraPrep PAR’s CHG composition is considered to be pharmacological means, we find that the CHG composition assists the applicator in its function, and thus we find the product described in the ChloraPrep PAR falls within the scope of BS EN 556-1. As to Patent Owner’s argument that the ChloraPrep PAR



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identifies and the MHRA classifies ChloraPrep as a “medicinal product,” as discussed above, we find that this does not preclude it also being subject to standards for medical devices.

Third, Patent Owner argues that “BS EN 556-1 states that the medical device can be designated ‘sterile’ if it is ‘terminally-sterilized’ (Part 1) or ‘aseptically processed’ (Part 2).” PO Resp. 36 (citing Ex. 1017, 6). This is significant, Patent Owner argues, because Part 2 of the BSI “states that aseptically-processed products can include unsterilized components.” *Id.*

We do not agree with this argument because Petitioner provides testimony from multiple witnesses that BS EN 556-1 applies to the ChloraPrep PAR and Patent Owner does not direct us to any evidence that BS EN 556-2, i.e., Part 2, applies. Moreover, based on our review of BS EN 556-2, it does not appear to apply to the ChloraPrep PAR. BS EN 556-2 states:

Medical devices designated “STERILE” are prepared using appropriate and validated methods. Whenever possible, sterile medical devices are terminally-sterilized using a properly validated and controlled sterilization process (see EN 556-1, EN 550, EN 552, EN 554 and EN ISO 14937). When a medical device is intended to be sterile but cannot be terminally-sterilized, aseptic processing is the method of manufacture (see EN 13824 and EN ISO 14160).

Ex. 2013, 6. Thus, BS EN 556-2 only applies when a medical device “is intended to be sterile but cannot be terminally-sterilized.” Here, there is no evidence that ChloraPrep PAR cannot be terminally sterilized. Indeed, as discussed *supra*, the evidence is to the contrary.

With respect to Patent Owner’s argument that the Petitioner has not shown that the sterility of ChloraPrep with Tint has been validated, we note

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that Petitioner has shown that BS EN 556-1 required products to have a particular SAL. On cross-examination, Dr. Rutala conceded that “you have to have a validated sterility process to have a sterility assurance level.” Ex. 1043, 159:20–25. This supports that a person of ordinary skill in the art would have understood the ChloraPrep PAR to disclose a product with a validated sterility process. *Id.*; *see also* Ex. 1003 ¶¶ 129–134 (Dr. Dabbah testimony on use of the word “sterile” in a regulatory context as requiring a specific SAL); Ex. 1017, 6 (BS EN 556-1, stating: “designation of a medical device as “*STERILE*” is only permissible when a validated sterilization process has been applied.”); 2013, 6 (BS EN 556-2, stating: “Medical devices designated ‘STERILE’ are prepared using appropriate and validated methods.”).

*b) “sterilized chlorhexidine gluconate composition”*

Claim 1 recites a “sterilized chlorhexidine gluconate composition.” Ex. 1001, 27:11. Petitioner contends ChloraPrep PAR discloses this limitation. Pet. 28 (citing Ex. 1003 ¶ 95). According to Petitioner ChloraPrep PAR’s “Module 2 . . . describes . . . in Section 6.5 (‘Nature and contents of container’), that the solution is sterile: ‘ChloraPrep with Tint is a *sterile* alcoholic antiseptic solution containing chlorhexidine gluconate and isopropyl alcohol in an applicator.’ *Id.* at 29 (citing Ex. 1005, 7; Ex. 1003 ¶ 95; Ex. 1001, 16:25-29). In addition, Petitioner points to ChloraPrep PAR’s Product Information Leaflet (“PIL”), which, like Module 2, Section 6.5, describes the chlorhexidine gluconate composition as a “sterile alcoholic antiseptic solution containing chlorhexidine gluconate and isopropyl alcohol in an applicator.” *Id.* (citing Ex. 1005, 10). Petitioner then argues that ChloraPrep PAR’s Module 5 includes a “discussion

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regarding the acceptance and validation of the methods for manufacturing the sterile CHG solution and applicator, further confirming the validated sterility of the device and solution.” *Id.*

As discussed above, Patent Owner argues the phrase “a sterilized chlorhexidine gluconate composition” means the “component or composition has been subjected to a suitable sterilization process such that sterility can be validated.” PO Resp. 21–23; *see* § II.C, *supra*. Based on this construction, Patent Owner contends the description “sterile” is not the same as “sterilized.” PO Resp. 21–23. Patent Owner argues:

While the PAR refers to “a sterile alcoholic antiseptic solution . . . in an applicator,” the word “sterile” had questionable meaning as used with regard to antiseptics in 2010, particularly given the Chloraprep label change described in 2015 that clarified the product previously labelled as “sterile” was in fact “nonsterile.” (*Id.*; Ex. 2006; Ex. 2009, 26, 34, 43, 50, 57.) Thus, the PAR’s use of the word “sterile” at that time did not teach that Chloraprep or its CHG composition were sterilized or that it could contain, deliver, and apply the sterilized composition.

Nothing in the PAR suggests to a POSA that it is describing anything other than an antiseptic capable of acting as an antimicrobial. (Rutala¶176.) That is particularly true since, as the Board recognized, Petitioner cites no prior art describing any known methods of sterilizing chlorhexidine gluconate as of 2010. (Dec. 33; §II.C.; Rutala¶¶172-175.) Indeed, the public knowledge well after 2010 was that, “[i]n the Chloraprep® applicator, the sealed glass ampule protects the CHG composition during the sterilization process . . . which could otherwise compromise the efficacy of the antiseptic composition” and “the solution inside of the [Chloraprep] applicators is not treated with a separate sterilization process and, therefore, is not sterile.” (*Id.*; Ex. 2015, ¶10; Ex. 2006, 1.)

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*Id.* at 22–23. Patent Owner cites to the FAQ to support its position. PO Resp. 25–26 (citing Ex. 2006). The FAQ document discloses: “[t]hough all ChloraPrep applicators are sterilized at the end of the manufacturing process, the solution inside of the applicators is not treated with a separate sterilization process and, therefore, is not sterile.” Ex. 2006, 1. Thus, Patent Owner argues “nothing in the PAR teaches that the solution is sterilized” and, more specifically, “[t]here is no disclosure of exposing any component of the product to a suitable sterilization process such that sterility can be validated.” PO Resp. 26. Finally, Patent Owner argues that “Petitioner failed to show that the CHG composition had been subjected to validated sterility processing.” *Id.* at 27.

In determining whether the ChloraPrep PAR discloses “a sterilized chlorahexidine gluconate composition,” we begin our analysis with the document itself. The ChloraPrep PAR states that its antiseptic is “a sterile alcoholic antiseptic solution containing chlorhexidine gluconate and isopropyl alcohol.” Ex. 1005, 7; *see also id.* at 10 (same). This strongly supports that the solution is sterilized. In this regard, we credit the testimony of Dr. Dabbah, who states:

Based on my extensive expertise with both the development of international standards for sterile products and sterilization, and my regulatory experience complying with the same, using the term ‘sterile’ to a regulatory approval of a medical device means unequivocally that the product has been sterilized.

Ex. 1003 ¶ 91; *see id.* ¶¶ 129–134. For the reasons discussed, *supra* § III.A.2.a., we find that a person of ordinary skill in the art would have understood BS EN 556-2 to apply to the ChloraPrep PAR and we do not agree with Patent Owner’s arguments to the contrary. The totality of the

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evidence supports that a person of ordinary skill in the art would have understood the ChlorPrep PAR described the “alcoholic antiseptic solution” as being sterilized, as claimed.

In addition to teaching that the antiseptic solution is sterilized, the ChlorPrep PAR separately states that the applicators are “sterile.” Ex. 1005, 7 (“The sterile applicators are individually packaged in ethyl vinyl acetate.”), 10 (same). By separately describing “a sterile alcoholic antiseptic solution” and “sterile applicators,” the ChlorPrep PAR suggests that each component – the antiseptic solution and the applicators – has been separately sterilized. This also supports that the solution has been sterilized.

Patent Owner and Dr. Rutala cite the FAQ to support that “the word ‘sterile’ had questionable meaning as used with regard to antiseptics in 2010, particularly given the ChlorPrep label change described in 2015 that clarified the product previously labelled as ‘sterile’ was in fact ‘nonsterile.’” PO Resp. 22. Thus, according to Patent Owner, a person of ordinary skill in the art would have understood that the CHG solution disclosed in the ChlorPrep PAR is not sterilized. PO Resp. 26 (citing Ex. 2006 (the FAQ); Ex. 2023 ¶¶ 206–208 (Dr. Rutala’s testimony, which cites Ex. 2006); Ex. 2015 ¶¶ 9–10). While this argument has some superficial appeal, we do not agree with it when considering the FAQ in the context of known differences between products and regulations in the U.S. and in Europe.

The FAQ was generated after the U.S. Food and Drug Administration (“FDA”) requested that “all manufacturers . . . voluntarily revise the product labels for topical antiseptics to indicate whether the drug is manufactured as a sterile or nonsterile product.” Ex. 2006, 1. “CareFusion adhered to the request and submitted revised labeling to the FDA.” *Id.* In connection with

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this label change, CareFusion issued a document responding to frequently asked questions, like: “Why is CareFusion updating the ChloroPrep® label to state ‘nonsterile solution?’” *Id.*

The FAQ includes several statements that support that the antiseptic solution in the product that was the subject of the label update is not sterilized. For example, the FAQ states: “Though all ChloroPrep applicators are sterilized at the end of the manufacturing process, the solution inside of the applicators is not treated with a separate sterilization process and, therefore, is not sterile.” Ex. 2006, 1. And the FAQ states “[c]urrently, sterile chlorhexidine gluconate-based products are not available because an efficient method does not exist to sterilize these antiseptic solutions on a large scale and within a time frame that meets customer demand.” *Id.*<sup>10</sup>

Importantly, however, the FAQ is directed to a product marketed in the United States. Ex. 2006, 1 (explaining that revised label was responsive to request from the U.S. Food and Drug Administration). In contrast, the ChloroPrep PAR is a regulatory filing by the MHRA concerning authorization to market ChloroPrep with Tint in the United Kingdom. Ex. 1005, 1 (identifying “UK licence no: PL 31760/0001”), 10 (stating that

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<sup>10</sup> The FAQ also states: “Unless a product says ‘sterile solution’ on the label, health care professionals should be aware that they are using a nonsterile solution product.” Ex. 2006, 1. This suggests that if a product is labeled “sterile solution,” the solution is sterile. In this regard, we note that the ChloroPrep PAR states that the product has a “sterile solution” but the pre-label change packaging for the U.S. ChloroPrep product does not. *Compare* Ex. 1006, 7, 10 (U.K. packaging disclosing a “sterile alcoholic antiseptic solution”), *with* Ex. 2009 (U.S. pre-label change packaging, stating “sterile” and stating “[a]pplicator is sterile if package is intact,” but not separately calling out the solution as “sterile”).

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the “[t]his medicinal product is authorized in the Member States of the EEA under the following names: . . . UK – ChloraPrep with Tint”), 14 (identifying the United Kingdom as the “Reference Member State” for the marketing authorization).

The distinction between the U.S. ChloraPrep product and the U.K.’s ChloraPrep product is significant because, as Degala teaches, the U.S. and European Union countries have different regulations regarding sterilization requirements and, a CareFusion product with sterilized CHG is manufactured for EU countries:

In the United States there are currently no regulations regarding the sterilization requirements of topical antiseptic solutions. Therefore, antiseptic solutions currently sold in the United States generally do not undergo a sterilization process. In other jurisdictions, however, such as European Union (EU) countries, some degree of sterilization is required. A known antiseptic solution containing 2% w/v chlorhexidine gluconate in 70% v/v isopropanol in water, manufactured by CareFusion Corp., is sterilized for EU countries using a known sterilization method.

Ex. 1007 ¶ 2. Patent Owner argues that this statement “has no bearing on ‘sterile’ in the [ChloraPrep] PAR” because “[t]here is no evidence that anyone in the public (including Dr. Dabbah) knew of any ‘sterilized’ ChloraPrep UK product or UK requirement about sterilizing CHG” and Petitioner “never contended that a POSA would be a UK regulatory expert versed in ChloraPrep.” Sur-reply. 13–14. We disagree.

Degala itself teaches that the chlorhexidine gluconate in a product made by CareFusion Corp, and matching the description of the product described in the ChloraPrep PAR, “is sterilized for EU countries.” *Compare* Ex. 1007 ¶ 2 (disclosing antiseptic solution containing 2% w/v chlorhexidine

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gluconate in 70% v/v isopropanol in water), *with* Ex. 1005, 5 (disclosing antiseptic solution containing “[c]hlorhexidine gluconate 20mg/ml” and “[i]sopropyl alcohol 0.70ml/ml”). And, two of Petitioner’s employees confirm that the version of the CloraPrep product sold in the U.K. had sterilized chlorhexidine gluconate. Ex. 1037 ¶¶ 2, 7 (testimony from Simon Noble-Clarke, the person who was “primarily responsible for the ChloraPrep product line as sold in the UK/Ireland,” that “the ChloraPrep UK product, unlike the US product was fully sterilized, including both the solution and the complete product”); Ex. 1038 ¶¶ 3, 4, 6, 10 (testimony of Christopher McGinley, who helped to support ChloraPrep products as sold in the US and as sold under license from the MHRA in the UK and EU, that “the CHG solution in the ChloraPrep UK product is sterilized to a SAL of  $10^{-6}$  and has been since it was first sold in the UK” and that “the CHG solution in the ChloraPrep US products was not sterilized, nor was it required by the FDA to be sterilized.”).<sup>11</sup>

Finally, in response to questions at an FDA hearing about sterile chlorhexidine gluconate products that were available overseas, Timothy P. Manthei, who is listed as an inventor of the ’067 patent, admitted to having heard of such a product, responding “I have heard that, that there’s a formulation out there, but I don’t know what it is, or how it’s used, or how they got to sterilization.” Ex. 1044, 41; Ex. 1001 code (72). Accordingly,

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<sup>11</sup> We do not agree with Patent Owner’s argument that Messrs. Noble-Clark and McGinley lacked personal knowledge of the pertinent facts. Sur-reply 11 n.6. Both witnesses were employed in roles that we expect would provide them personal knowledge as to whether the CHG solution in the UK ChloraPrep product was separately sterilized during the relevant time period. Ex. 1037 ¶¶ 1–3; Ex. 1038 ¶¶ 1–4, 6.



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the record supports that information about a product with a sterilized CHG composition was available to and known by the public, and that a person of ordinary skill in the art considering the ChloroPrep PAR would have known this.

As to Patent Owner’s attempt to discount the difference in regulatory regimes between the U.S. and the U.K. by arguing that “Petitioner never contended that a POSA would be a UK regulatory expert,” we have already found that a person of ordinary skill in the art would have understood that the product described in the ChloroPrep PAR was required to comply with applicable standards, including BS EN-556-1. *See supra* § III.A.2.a. We credit the testimony of Dr. Dabbah that a person of ordinary skill in the art would have been “very familiar” with processes for validating the sterility of various products to industry standards and “would consider them routine.” Ex. 1003 ¶ 71. Implicit in developing these processes for validating sterility is an understanding of what the standards require in order to establish sterility. *Id.* We further credit the testimony of Dr. Dabbah that a person of ordinary skill in the art would “immediately understand . . . that U.K. and European standards for SAL applied to the *ChloroPrep PAR*.” *Id.* ¶ 133; *see also* Ex. 1040, 199:24–200:18 (Dr. Rutala testimony that “I would agree that it’s likely that a POSA would be aware of ISO standards. And likely, they would be aware of the ISO standards for steam sterilization or moist heat as well as ethylene oxide, dry heat.”).

Moreover, both parties agree that a person of ordinary skill in the art would have at least four years of industry experience. Pet. 15; PO Resp. 15; Ex. 2023 ¶ 143. Our definition of a person of ordinary skill in the art reflects this. *See supra* § II.D. We find it implausible that someone with

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four years of experience with sterilization processes for medical products and their components would lack familiarity with the regulatory regimes that set the conditions under which the products or processes they work with may be used.

Accordingly, we do not agree with Patent Owner’s argument that a person of ordinary skill in the art would have understood the word “sterile” as used with regard to antiseptics in the ChloraPrep PAR to have “questionable meaning” in view of the U.S. label change. We find that a person of ordinary skill in the art would have been aware of regulatory differences between the U.S. and the U.K. and would have been aware that a product with a sterilized CHG solution was sold in Europe. With this understanding, a person of ordinary skill in the art would not have found the word “sterile” in the ChloraPrep PAR to have “questionable meaning.” To the contrary, as discussed above, a person of ordinary skill in the art would have understood the term “sterile” in a regulatory document to have a specific meaning, and thus understood the phrase “a sterile alcoholic antiseptic solution containing chlorhexidine gluconate and isopropyl alcohol” in the ChloraPrep PAR to refer to a sterilized CHG solution. *See* Ex. 1005, 7, 10; Ex. 1003 ¶¶ 91, 129–134.

Patent Owner next argues that a person of ordinary skill in the art “would not conflate ‘sterile’ in the PAR with ‘sterilized’” particularly given that “Petitioner identifies no known methods of sterilizing CHG existing in 2010,” the date when the ChloraPrep PAR was published. PO Resp. 26. According to Patent Owner, in 2010, it was thought that “sterilization was unnecessary because antiseptics ‘demonstrate a broad spectrum of antimicrobial activity.’” *Id.* (citing Ex. 1008). In addition, Patent Owner

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argues that in 2010, it was known that ChloroPrep’s glass ampules prevented sterilization of the solution within them. *Id.* (citing Ex. 2015 (Chiang, which was discussed *supra* § III.A.2.a)). We do not agree with these arguments.

There is some support in the record for Patent Owner’s argument that a person of ordinary skill in the art in 2010 would have thought that sterilization of antiseptic solutions was unnecessary. *See e.g.*, Ex. 1008 ¶ 178 (Scholz, disclosing that “[m]any of the compositions of [Scholz’s] invention demonstrate a broad spectrum of antimicrobial activity and thus are generally not terminally sterilized.”); Ex. 1007 ¶ 2 (Degala, teaching that “[i]n the United States there are currently no regulations regarding the sterilization requirements of topical antiseptic solutions”). There also is support in the record for the proposition that a person of ordinary skill in the art in 2010 would have thought sterilization of antiseptic solutions was important. Ex. 2023 ¶¶ 54–55 (Dr. Rutala, explaining that “[a]round 2010 to 2011, a serious infectious outbreak occurred that was linked to contamination of antiseptic alcohol swabs” and that, “[b]y the early 2010s, the concerns about contamination of antiseptic products became a significant concern”). It is irrelevant, however, whether a person of ordinary skill in the art would have thought sterilization of antiseptics was necessary as of 2010 because, we do not agree that a person of ordinary skill in the art would have understood that CareFusion, the author of the ChloroPrep PAR, could describe an antiseptic solution as “sterile” in a regulatory document when it was not, in fact, sterile.

As to Patent Owner’s argument that the Petitioner does not identify known methods of sterilizing CHG dating back to the ChloroPrep PAR’s publication date, Petitioner cites Scholz, which was published in 2006, as

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disclosing “sterilizing the claimed chlorhexidine gluconate solution composition via any number of “industry standard techniques,” including electron beam, gamma radiation, or heat.” Pet. 14 (citing Ex. 1008 ¶ 178). The parties dispute whether Scholz teaches sterilized CHG. The relevant disclosure from Scholz is reproduced below.

Many of *the compositions* of [Scholz’s] invention demonstrate a broad spectrum of antimicrobial activity and thus are generally not terminally sterilized but if necessary may be sterilized by a variety of industry standard techniques. For example, it may be preferred to sterilize *the compositions* in their final packaged form using electron beam. It may also be possible to sterilize *the sample* by gamma radiation or heat. Other forms of sterilization may be acceptable. It may also be suitable to include preservatives in *the formulation* to prevent growth of certain organisms. Suitable preservatives include [list of compounds], as well as combinations of these compounds.

Ex. 1008 ¶ 178 (emphasis added). Dr. Dabbah testifies that this disclosure “describes sterilizing the claimed gluconate solution composition” using techniques that a person of ordinary skill in the art “would have been familiar with.” Ex. 1003 ¶ 75. Dr. Rutala disagrees asserting that “Scholz suggests that sterilization processes can be used on packaging, but provides no successful methods for sterilizing a CHG composition within that packaging.” Ex. 2023 ¶ 78; *see id.* ¶¶ 74–78.

Despite Dr. Rutala’s testimony, Scholz states, unequivocally, that “the compositions of [Scholz’s] invention . . . may be sterilized by a variety of industry standard techniques.” Ex. 1008 ¶ 178. And this disclosure is presumed enabled. *In re Sasse*, 629 F.2d 675, 681 (CCPA 1980); *see also In re Antor Media Corp.*, 689 F.3d 1282, 1288 (Fed. Cir. 2012). As are Scholz’s disclosures regarding sterilizing “the compositions . . . using

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electron beam” and sterilizing “the sample by gamma radiation or heat.” *Id.* Dr. Rutala does not explain why a person of ordinary skill in the art would have understood Scholz to disclose sterilization of only the packaging. *See* Ex. 2023 ¶¶ 74–78. Nor does Dr. Rutala provide sufficient evidence or a compelling explanation why a person of ordinary skill in the art would disregard Scholz’s teaching that “a variety of industry standard techniques,” including, e.g., an “electron beam,” and “heat,” can be used to sterilize “the composition” and/or “the sample.” Absent such explanation or evidence, we do not credit Dr. Rutala’s opinions on Scholz. *See In re Am. Acad. of Sci. Tech Ctr.*, 367 F.3d 1359, 1368 (Fed. Cir. 2004) (“[T]he Board is entitled to weigh the declarations and conclude that the lack of factual corroborations warrants discounting the opinions expressed in the declarations.”).

Even if we were to credit Dr. Rutala’s testimony, and disregard Scholz as evidence that it was known CHG could be sterilized as of 2006, we would still disagree with Patent Owner’s argument that the absence of knowledge about techniques for sterilizing CHG in 2010 supports that a person of ordinary skill in the art would have understood the ChloroPrep PAR to disclose an unsterilized composition. In this regard, we note that one of the inventors of the ’067 patent stated, on December 12, 2012, that he was aware of a sterilized CHG product sold in Europe. Ex. 1044, 1, 20 (statement of ’067 patent inventor Timothy P. Manthei at December 12, 2012, FDA hearing). This supports that a person of ordinary skill in the art would have known that sterilization of CHG was possible at least as early as December 2012. Consistent with this finding, Degala describes a sterilization process for CHG as prior art *to Degala*, which was filed on January 8, 2014. Ex. 1007 ¶ 2 (“A known antiseptic solution containing

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[CHG] . . . is sterilized for EU countries *using a known sterilization method.*”) (emphasis added). Given that it was known that CHG could be sterilized shortly after the publication of the ChloroPrep PAR, we do not agree that a person of ordinary skill in the art, reading the ChloroPrep PAR at the time of the invention, would have understood “sterile alcoholic antiseptic solution containing chlorhexidine gluconate and isopropyl alcohol” to refer to an unsterilized CHG solution. To the contrary, particularly in light of the applicable regulations discussed above, we find that a person of ordinary skill in the art would have understood it to refer to sterilized CHG.

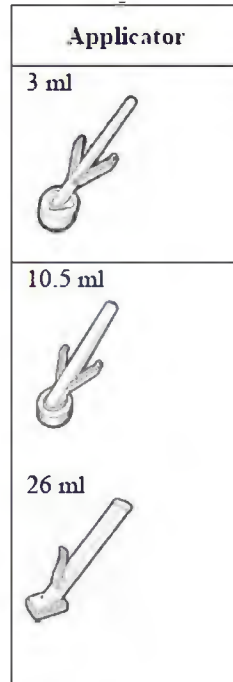
With respect to Patent Owner’s argument that Petitioner has not shown that the sterility of CHG in the product disclosed in the ChloroPrep PAR has been validated, we note, as we did above in connection with the preamble, that Petitioner has shown that BS EN 556-1 requires products to have a particular SAL. On cross-examination, Dr. Rutala conceded that “you have to have a validated sterility process to have a sterility assurance level.” Ex. 1043, 159:20–25. This supports a conclusion that a person of ordinary skill in the art would have understood the ChloroPrep PAR to disclose a product in which CHG had been sterilized using a validated sterility process. *Id.*; see Ex. 1003 ¶¶ 129–134.

c) “*an applicator for facilitating application of the sterilized chlorhexidine composition*”

Claim 1 recites an applicator for facilitating application of the sterilized chlorhexidine composition.” Ex. 1001, 27:12–13. Petitioner contends ChloroPrep PAR discloses “an applicator for facilitating application of the sterilized chlorhexidine composition” as required by

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claim 1. Pet. 30 (citing Ex. 1003 ¶ 96). Petitioner relies on Figure from page 5 of ChloroPrep PAR, reproduced, as excerpted by Petitioner, below.



*Id.* (citing Ex. 1005, 5). The figure excerpted above depicts three differently size applicators (3 ml, 10.5 ml, and 26 ml). *Id.* “The applicators consist of a latex-free sponge attached to a plastic handle/barrel which holds a latex-free dyed pledget and glass ampoule containing the antiseptic solution.”

Ex. 1005, 7.

Patent Owner argues that “a POSA at the time [would have understood] that the challenge was not only creating a sterilized CHG composition but also providing for an applicator that facilitated application of it.” PO Resp. 27 (citing Ex. 2023 ¶¶ 69, 214). Patent Owner further argues that “Petitioner identifies an applicator, but does not address how it is configured to facilitate application of a sterilized composition.” *Id.* (citing Ex. 2023 ¶¶ 212–215). We do not agree with this argument.

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The Petition and Dr. Dabbah explain how the applicator facilitates application of CHG by block quoting Section 4.2 of the ChloraPrep PAR, which discusses how the applicator is used. Pet. 32; Ex. 1003 ¶ 98. The quoted passage reads as follows:

The applicator is removed from the wrapper and held with the sponge facing downward. The applicator is squeezed gently to break the ampoule containing the antiseptic solution, which is released onto the sponge in a controlled flow (for the 26 ml applicator the lever is pressed). The broken ampoule remains safely contained within the applicator. The sponge is gently pressed against the patient's skin in order to apply the antiseptic solution. A back and forth action of the sponge should be used for 30 seconds.

Ex. 1005, 5. This passage makes clear that the configuration of the applicator facilitates application of CHG by providing a convenient way to release a controlled flow of antiseptic solution in such a way that it can be applied to the patient's skin. Accordingly, we agree with Petitioner that the ChloraPrep PAR discloses an applicator for facilitating application of a composition.

*d) "a barrier configured to be compromised to impregnate the applicator with the sterilized chlorhexidine gluconate composition"*

Claim 1 further recites "a barrier configured to be compromised to impregnate the applicator with the sterilized chlorhexidine gluconate composition." Ex. 1001, 27:14–16. Petitioner contends the ChloraPrep PAR discloses this limitation. Pet. 31–33 (citing Ex. 1003 ¶¶ 99–100). Petitioner argues that the ChloraPrep PAR describes "a receptacle in the form at least one glass ampoule housed within the applicator's plastic barrel which contains the sterilized CHG composition." *Id.* (citing Ex. 1005, 7, 18).



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According to Petitioner, “[w]hen compromised by breaking it (‘the applicator is squeezed gently to break the ampoule’), the ampoule provides the sterilized CHG composition to impregnate the applicator by releasing the CHG into the sponge portion of the applicator (‘the antiseptic solution . . . is released onto the sponge in a controlled flow’).” *Id.* Petitioner quotes from Section 4.2 of the ChloroPrep PAR (quoted *supra* § III.2.c) to support its position. Pet. 32–33.

Patent Owner argues:

While Petitioner identifies a “glass ampoule containing the antiseptic solution,” Petitioner does not identify anything in the PAR that indicates the ampoule contains a sterilized composition or how it is configured “to provide the sterilized CHG composition to impregnate the applicator when the receptacle is compromised.” (Rutala ¶¶ 216–219.) Petitioner’s arguments simply assume the element.

PO Resp. 27–28. We do not agree with this argument.

For the reasons discussed *supra* § III.A.2.b, we find that a person of ordinary skill in the art would have understood the ChloroPrep PAR to disclose a sterilized CHG composition. Thus, we do not agree with Patent Owner’s argument that “Petitioner does not identify anything in the PAR that indicates the ampoule contains a sterilized composition.” The Petition also explains that “[w]hen compromised by breaking it (‘the applicator is squeezed gently to break the ampoule’), the ampoule provides the sterilized CHG composition to impregnate the applicator by releasing the CHG into the sponge portion of the applicator (‘the antiseptic solution . . . is released onto the sponge in a controlled flow’).” Pet. 32–33 (block quoting Section 4.2 of the ChloroPrep PAR). The Petition thus explains that the ampoule is configured such that it is breakable and such that it releases the antiseptic

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solution into the sponge when it is broken. *Id.* For this reason, we do not agree with Patent Owner’s argument that Petitioner “does not identify anything in the PAR that indicates . . . how [the ampule] is configured ‘to provide the sterilized CHG composition to impregnate the applicator when the receptacle is compromised.’” PO Resp. 27–28.

Based on the disclosure in ChloraPrep PAR of an ampule that is broken to release a CHG composition, we agree with Petitioner that the ChloraPrep PAR discloses a receptacle that impregnates the applicator with chlorhexidine gluconate when the receptacle is compromised.

*e) “wherein the sterilized chlorhexidine gluconate composition comprises chlorhexidine gluconate and alcohol”*

Petitioner contends ChloraPrep PAR discloses that “the sterilized chlorhexidine gluconate composition comprises chlorhexidine gluconate and alcohol” as required by claim 1. Pet. 33–34 (citing Ex. 1005, 4, 5, 7, 10; Ex. 1003 ¶¶ 101–02). Patent Owner argues that Petitioner “does not explain how” the ChloraPrep PAR discloses “that *both* the CHG and alcohol have been subjected to the requisite sterilization process.” PO Resp. 28.

For the reasons discussed *supra* § III.A.2.b, we find that a person of ordinary skill in the art would have understood the ChloraPrep PAR to disclose a sterilized CHG composition. As to the argument that Petitioner has not established that both the CHG and the alcohol have been sterilized, the ChloraPrep PAR discloses “a sterile alcoholic antiseptic solution containing chlorhexidine gluconate and isopropyl alcohol.” Ex. 1005, 7. The word “sterile” in this disclosure modifies the term “solution,” and the “solution” is described as “containing chlorhexidine gluconate and isopropyl alcohol.” *Id.* Accordingly, we find that a person of ordinary skill in the art

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would have understood that both the CHG and the alcohol in the “sterile alcoholic antiseptic solution” had been sterilized.

2. *Analysis of Independent claim 12*

a) *preamble “a method of using a sterilized chlorhexidine article, said method comprising”*

Claim 12 recites a “method of using a sterilized chlorhexidine article.”

Ex. 1001, 28:8–9. Petitioner contends that to the extent the preamble is limiting, the ChloraPrep PAR discloses the elements of the preamble. As proof, Petitioner directs us to its poof with respect to the preamble of claim 1, which we discussed *supra* § III.A.2.a. Pet. 34. In addition, Petitioner directs us to Section 4.2 of the ChloraPrep PAR, which Petitioner contends provides “a detailed explanation of use of the product for topical disinfection, including choice of size of applicator and particular procedure requiring topical disinfection.” *Id.* (citing Ex. 1005, 5). According to Petitioner, “Section 4.2 specifically teaches the steps for using the product for topical disinfection.” *Id.* at 34–35 (citing Ex. 1005, 5, 9).

Patent Owner argues: “Petitioner failed to explain how the ‘sterilized . . . article’ is disclosed for the same reasons it failed to explain how a ‘sterilized . . . product’ is disclosed.” PO Resp. 29. More specifically, Patent Owner argues that “[t]he PAR does not disclose that the article as a whole is sterile, let alone subjected to a suitable sterilization process where sterility can be validated.” *Id.* We do not agree with Patent Owner’s arguments for the reasons discussed *surpa* § III.A.2.a.

We find that the ChloraPrep PAR discloses a method of using the product it describes. Ex. 1005, 5, 9. Furthermore, for the reasons discussed *supra* § III.A.2.a, a person of ordinary skill in the art would have understood

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the ChloraPrep PAR to disclose that the entire produced described in the ChloraPrep PAR was sterilized. Accordingly, we find that the ChloraPrep PAR discloses a sterilized chlorhexidine article.<sup>12</sup>

*b) “providing a sterilized chlorhexidine article”*

Claim 12 recites the step of “providing a sterilized chlorhexidine article.” Ex. 1001, 28:10–11. Petitioner contends that the ChloraPrep PAR discloses this claim element, and directs us to its proof for the preamble of claim 1, which we discussed *supra* § III.A.2.a. Pet. 35. Petitioner then directs us to its proof that the article is comprised of an applicator, a receptacle, and a solution of chlorhexidine gluconate and alcohol. *Id.* Finally, Petitioner notes that the ChloraPrep PAR describes using the article for topical disinfection. *Id.*

Patent Owner relies on the same arguments it made with respect to the preamble of claim 12, which we discussed *supra* § III.A.3.a. PO Resp. 29. For the reasons discussed *supra* § III.A.3.a, we find that the ChloraPrep PAR discloses a sterilized chlorhexidine article.

*c) “a sterilized chlorhexidine gluconate composition comprising chlorhexidine gluconate and alcohol”*

Claim 12 recites “a sterilized chlorhexidine gluconate composition comprising chlorhexidine gluconate and alcohol.” Ex. 1001, 28:12–13. This limitation overlaps with the limitations of claim 1 discussed *supra* §§ III.A.2.b and III.A.2.e. Petitioner relies on the same proof discussed in

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<sup>12</sup> As with claim 1, we do not determine whether the preamble to claim 12 is limiting because, regardless of whether the preamble is limiting, Petitioner has shown that the recitation in the preamble is satisfied by the prior art.

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those sections and Patent Owner relies on the same arguments in opposition. Pet. 36; PO Resp. 29. For the reasons discussed *supra* §§ III.A.2.b and III.A.2.e, we find that the ChloraPrep PAR discloses a “sterilized chlorhexidine gluconate composition comprising chlorhexidine gluconate and alcohol.”

*d) “an applicator for facilitating application of the sterilized chlorhexidine”*

Claim 12 recites “an applicator for facilitating application of the sterilized chlorhexidine.” Ex. 1001, 28:14–15. This limitation overlaps with the limitations of claim 1 discussed *supra* §§ III.A.2.a and III.A.2.c. Petitioner relies on the same proof discussed in those sections and Patent Owner relies on the same arguments in opposition. Pet. 37; PO Resp. 30. For the reasons discussed *supra* §§ III.A.2.a and III.A.2.c, we find that the ChloraPrep PAR discloses a “an applicator for facilitating application of the sterilized chlorhexidine.”

*e) “a barrier between the sterilized chlorhexidine gluconate composition and the applicator”*

Claim 12 recites “a barrier between the sterilized chlorhexidine gluconate composition and the applicator.” Ex. 1001, 28:16–17. This limitation overlaps with the limitations of claim 1 discussed *supra* §§ III.A.2.a and III.A.2.d. Petitioner relies on the same proof discussed in those sections and Patent Owner relies on the same arguments in opposition. Pet. 37; PO Resp. 30. For the reasons discussed *supra* §§ III.A.2.a and III.A.2.d, we find that the ChloraPrep PAR discloses a “an applicator for facilitating application of the sterilized chlorhexidine.”

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*f) “compromising the barrier to impregnate the applicator with the sterilized chlorhexidine gluconate composition”*

Claim 12 recites the step of “compromising the barrier to impregnate the applicator with the sterilized chlorhexidine gluconate composition.” Ex. 1001, 28:18–20. Petitioner contends that the ChloraPrep PAR discloses this step because it “instructs users to ‘remove the applicator from the wrapper,’ at which point ‘[t]he applicator is squeezed gently to break the ampoule containing the antiseptic solution, which is released into the sponge in a controlled flow.’” Pet. 36–37 (citing Ex. 1005, 5).

Patent Owner argues that the ChloraPrep PAR does not disclose this limitation “because no sterilized CHG composition is disclosed.” PO Resp. 30. We do not agree with this argument for the reasons discussed *supra* §§ III.A.2.b. Patent Owner also argues that the ChloraPrep PAR does not disclose this limitation “there is no description of how a receptacle is configured ‘to provide the sterilized [CHG] composition to impregnate the applicator.’” *Id.* We do not agree with this argument for the reasons discussed *supra* §§ III.A.2.d.

*g) “applying the sterilized chlorhexidine gluconate composition to a patient’s skin using the applicator”*

Claim 12 recites the step of “applying the sterilized chlorhexidine gluconate composition to a patient’s skin using the applicator.” Ex. 1001, 28:21–22. Petitioner contends that the ChloraPrep PAR discloses this step because it “teaches the steps for using the product for topical disinfection, including squeezing the applicator [to] ‘break the ampoule containing the antiseptic solution’ which is released into a sponge which ‘is gently pressed against the patient’s skin in order to apply the antiseptic solution.’” Pet. 37–38 (citing Ex. 1005, 5, 9). Patent Owner relies on the same arguments it

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made with respect to the limitation discussed *supra* § III.A.3.f. PO Resp. 30. We find that the ChloraPrep PAR discloses this limitation. Ex. 1005, 5, 9. We do not agree with Patent Owner’s arguments for the reasons discussed *supra* § III.A.3.f.

3. *Claims 2 and 13*

Claim 2 depends from claim 1 and additionally requires that “the receptacle contains the sterilized chlorhexidine gluconate composition in an amount between 0.1 and 100 mL.” Ex. 1001, 27:19–21. Claim 13 depends from claim 12 and additionally requires that “the applicator is impregnated with 0.1 to 100 mL of the sterilized chlorhexidine gluconate composition.” *Id.* at 28:23–25. Petitioner contends that the ChloraPrep PAR discloses these limitations because it teaches three amounts falling within claimed range, 3 mL, 10.5 mL, and 26 mL. Pet. 38–39.

Patent Owner argues that the ChloraPrep PAR does not disclose these limitations “[b]ecause the PAR fails to disclose the sterilized CHG composition.” PO Resp. 31. We do not agree with this argument for the reasons discussed *supra* §§ III.A.2.b.

Patent Owner also argues: “Petitioner does not explain how the PAR discloses the distinct requirement of Claim 13 that ‘when the receptacle is compromised, the applicator is impregnated with 0.1 to 100 mL of the sterilized [CHG] composition.’” PO Resp. 31. Patent Owner cites to the testimony of Dr. Rutala who contends that Dr. Dabbah “addresses the volume of CHG solution in the device,” but does not explain how recited volume of sterilized CHG impregnates the applicator when the receptacle is compromised. Ex. 2023 ¶ 254. We do not agree with this argument.

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Petitioner explains that, “[t]he *ChloraPrep PAR* . . . teaches that when the receptacle is compromised, the antiseptic CHG solution is ‘released onto the sponge in a controlled flow,’ thus impregnating the applicator with 0.1 to 100 mL of the sterilized chlorhexidine gluconate composition.” *Id.* at 39 (citing Ex. 1005, 5). This is sufficient. Given the broad range recited in the claims, which extends to as little as 0.1 mL, and the comparatively large amounts exemplified in the *ChloraPrep PAR*, which may be as large as 26 mL, it not plausible that the amount of CHG solution that would be “released onto the sponge in a controlled flow” when the ampule is broken (Ex. 1005, 5) would fail to fall within the recited range. Accordingly, we find that the *ChloraPrep PAR* discloses impregnating the applicator with 0.1 to 100 mL of sterilized CHG when the receptacle is compromised.

#### 4. *Claims 3 and 14*

Claim 3 depends from claim 1 and additionally recites that the CHG composition comprises a specific amount of chlorhexidine gluconate (“from 1.5 to 5.0 wt. % based on the total weight of said sterilized antiseptic composition”) and a specific amount of alcohol (“50 wt. % based on the total weight of the sterilized antiseptic composition”). Ex. 1001, 27:22–28. Claim 14 depends from claim 12 and recites the same amounts of chlorhexidine gluconate and alcohol as are recited in claim 3. *Id.* at 28:25–30. Petitioner contends that the *ChloraPrep PAR* discloses a CHG composition in which the amount of chlorhexidine gluconate and the amount of alcohol fall within the claimed ranges. Pet. 40–42.

Patent Owner does not dispute that the amounts of chlorhexidine gluconate and alcohol disclosed in the *ChloraPrep PAR* fall within the claimed ranges, but repeats its argument that the composition is not



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sterilized and thus does not meet the additional limitations of claims 3 and 14. PO Resp. 31. We do not agree with this argument for the reasons discussed *supra* §§ III.A.2.b. We find that the ChloraPrep PAR discloses a composition meeting the additional limitations of claims 3 and 14 for the reasons set forth in the Petition. *See* Pet. 41–42.

*5. Claims 5 and 15*

Claim 5 depends from claim 1 and additionally recites that the alcohol in the sterilized CHG composition is isopropyl alcohol. Ex. 1001, 27:35–36. Claim 15 depends from claim 12 and also additionally recites that the alcohol is isopropyl alcohol. *Id.* at 28:31–32. Petitioner contends that the ChloraPrep PAR discloses a CHG composition where the alcohol is isopropyl alcohol. Pet. 42–43.

Patent Owner does not dispute that CHG composition disclosed in the ChloraPrep PAR comprises isopropyl alcohol, but repeats its argument that the composition is not sterilized and thus does not meet the additional limitations of claims 3 and 14. PO Resp. 31. We do not agree with this argument for the reasons discussed *supra* §§ III.A.2.b. We find that the ChloraPrep PAR discloses a composition meeting the additional limitations of claims 5 and 15 for the reasons set forth in the Petition. *See* Pet. 42–43.

*6. Claims 6 and 16*

Claim 6 depends from claim 1 and additionally recites that the sterilized CHG composition comprises water. Ex. 1001, 27:37–39. Claim 16 depends from claim 12 and also additionally recites that the sterilized CHG composition comprises water. *Id.* at 28:33–34. Petitioner contends that the ChloraPrep PAR discloses a CHG composition where

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“purified water” is listed as an excipient and as an “inactive ingredient.”  
Pet. 43.

Patent Owner does not dispute that CHG composition disclosed in the ChloroPrep PAR comprises water, but repeats its argument that the composition is not sterilized and thus does not meet the additional limitations of claims 3 and 14. PO Resp. 32. We do not agree with this argument for the reasons discussed *supra* §§ III.A.2.b. We find that the ChloroPrep PAR discloses a composition meeting the additional limitations of claims 6 and 16 for the reasons set forth in the Petition. *See* Pet. 43.

*7. Claims 7, 8, 17, and 18*

Claims 7 and 17 recite that “the sterilized chlorhexidine gluconate composition [of claim 1/12] further comprises one or more additives selected from the group consisting of [seven “sterilized” additives including] a sterilized colorant.” Claims 8 and 18 depend from claims 7 and 17 and further recite that “the additive is a colorant.” Petitioner contends that the ChloroPrep PAR meets the additional limitations of claims 7, 8, 17, and 18 because it discloses an “Orange Solution” which uses the excipient “Sunset Yellow E110).” Pet. 44–45. Dr. Dabbah testifies that “[a]s an excipient included within the sterilized chlorhexidine gluconate solution, that colorant is similarly sterile and sterilized.” Ex. 1003 ¶ 127.

Patent Owner argues that “Petitioner identifies nothing in the PAR that states the tint is in the ‘alcoholic antiseptic solution’” and “the PAR does not disclose[] that the ‘tint’ is sterile – much less sterilized.” PO Resp. 32–33. In addition, Patent Owner points to Chiang as teaching that the “dye is separate from the solution.” *Id.* And in its Sur-reply, Patent Owner cites the testimony of Mr. Noble-Clark to support that “the dye is not

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in the solution but in the applicator head.” Sur-reply 17 (citing Ex. 2044, 64:5–65:19).

The evidence of record supports that the dye in the product described in the ChloraPrep PAR is not initially stored in the reservoir with the CHG composition. The ChloraPrep PAR states that its applicators “consist of a latex-free sponge attached to a plastic handle/barrel which holds a latex-free dyed pledget and glass ampoule containing the antiseptic solution.” Ex. 1005, 7. Thus, the applicator includes both a sponge and a pledget. A pledget is a device positioned “between the glass ampoule and the sponge.” Ex. 2044, 64:10–65:12. According to Mr. Noble-Clarke, “when you . . . break the ampoule, the solution runs through the pledget picking up the dye so that what the sponge in fact dispenses onto the patient becomes a tinted rather than a clear chlorhexidine.” Ex. 2044, 65:5–8. Mr. Noble-Clarke’s testimony that solution picks up the dye when it runs through the pledget is consistent with the repeated description of a “dyed pledget” in the ChloraPrep PAR. Ex. 1005, 7, 10, 18. It also is consistent with Chiang, which teaches that “the ChloraPrep® applicators have the CHG composition in a glass ampule and the dye composition is provided in the foam applicator head.” Ex. 2015 ¶ 13.

Although the dye in the ChloraPrep PAR product is initially in the pledget rather than the ampule as part of the CHG solution, the ChloraPrep PAR still identifies the dye as an “excipient.” *Id.* at 7 (identifying “[p]urified water” and “Sunset Yellow (E110)” as excipients), 17 (“Other ingredients consist of excipients, namely sunset yellow (E110) and purified water.”). An excipient is “an inactive ingredient in the composition” and is

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“essentially the medium in some way for the active substance.” Ex. 1040, 234:15–239:7 (testimony of Dr. Rutala).

In order to reconcile the evidence that Sunset Yellow is in the pledget with the evidence that it is an “excipient,” we find that Sunset Yellow must become an excipient when CHG solution passes through the pledget. This explanation is consistent with the explanation Patent Owner’s counsel provided at oral argument:

Now you asked earlier about an excipient. It [the dye] is an excipient. It’s an excipient in the barrel or handle. But there’s nothing that requires it to be in the solution. And it is also an excipient when it’s finally applied onto the patient when it, in fact, becomes an orange solution. But in terms of what’s disclosed as sterile, there’s no indication that that pledget was ever sterile.

Tr. 61. In sum, regardless of when the Sunset Yellow (E110) enters into solution with the remainder of the CHG solution, it is still considered an excipient.

The identification of the dye in the ChloroPrep PAR as an excipient supports that it is sterile. In his deposition, Dr. Rutala explained:

Q: . . . For -- for a composition to be considered sterile, the excipients have to be sterile, too, right?

A: If you’re -- only want a definition of the word “sterile,” the excipients would have to be sterile and devoid of microbial contamination.

Ex. 1040, 238:20–239:7; *see generally* 234:15–239:7. This testimony is consistent with that of Dr. Dabbah, who testifies: “[a]s an excipient included within the sterilized chlorhexidine gluconate solution, that colorant [Sunset Yellow] is similarly sterile and sterilized.” Ex. 1003 ¶ 127. Dr. Dabbah further testifies that “approval of ChloroPrep’s description as a sterile

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composition in the ChloraPrep PAR, requires the sterilization of all substances in the solution.” *Id.*

Accordingly, we find that the colorant disclosed in the ChloraPrep PAR is sterile. This finding is additionally supported by the statement in the ChloraPrep PAR that “ChloraPrep *with Tint* is a sterile alcoholic antiseptic solution.” Ex. 1005, 7. In this statement, the word “sterile” modifies the whole term “ChloraPrep with Tint.”

For the reasons discussed above, we find that ChloraPrep PAR discloses the additional limitations recited in claims 7, 8, 17, and 18.

8. *Claims 10 and 19*

Claims 10 and 19 depend from claims 1 and 12 and further recites that the sterilized chlorhexidine article “has a sterility assurance level of from  $10^{-3}$  to  $10^{-9}$ .” Petitioner contends that because the ChloraPrep PAR is a UK regulatory document, a person of ordinary skill in the art would have understood that “when the ChloraPrep PAR describes the product and its components as ‘sterile,’ it is directly and necessarily referring to a sterility assurance level within the range from  $10^{-3}$  to  $10^{-9}$  – specifically  $10^{-6}$ .” Pet. 45–48. More specifically, Petitioner contends that the regulations applicable to medical devices require that “to describe the medical device and its components as ‘sterile,’ they must have a sterility assurance level of  $10^{-6}$ .” *Id.* at 46 (citing BS EN 556-1).

In response Patent Owner repeats its argument that Petitioner has not established that the entire product or article disclosed in the ChloraPrep PAR has been sterilized. PO Resp. 33. We do not agree with this argument for the reasons discussed *supra* § III.A.2.a.

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Patent Owner also makes several arguments as to why BS EN 556-1 does not apply to the ChloraPrep PAR. We discussed these arguments *supra* § III.A.2.a, and do not agree with them for the reasons discussed therein. In that section, which we incorporate herein, we found that a person of ordinary skill in the art would have understood BS EN 556-1 to apply to the product disclosed in the ChloraPrep PAR. BS EN 556-1 requires a sterility assurance level of  $10^{-6}$ . Ex. 1017, 8. In addition, Dr. Rutala testified that a SAL of  $10^{-6}$  is the common, widely accepted standard for designating a component or device as “sterile.” *See* Ex. 1040, 235:16–237:22. For these reasons, we find that a person of ordinary skill in the art would have understood the product disclosed in the ChloraPrep PAR to have a sterility assurance level of  $10^{-6}$ , thus meeting the sterility assurance level requirement recited in claims 10 and 20.

#### 9. Claim 11

Claim 11 depends from claim 1 and further recites that the applicator comprises a foam. Petitioner contends that the ChloraPrep PAR discloses this additional limitation by disclosing that the applicator includes a sponge. Pet. 48–50 (citing Ex. 1005, 5). Petitioner cites the testimony of Dr. Dabbah, who testifies that “[a] POSA would recognize . . . that a sponge is a foam.” Ex. 1003 ¶ 137 (cited at Pet. 51); *see also* Ex. 1001, 7:14–22 (disclosing that “the foam may comprise an open-celled foam”).

Patent Owner does not dispute that the ChloraPrep PAR discloses that the applicator comprises a foam, arguing only that Petitioner has not established anticipation of independent claim 1. PO Resp. 36. We do not agree with this argument for the reasons discussed *supra* §§ III.A.2. We find that the ChloraPrep PAR discloses a composition meeting the additional

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limitations of claim 11 for the reasons set forth in the Petition. *See* Pet. 49–51.

*10. Enablement of the ChloroPrep PAR*

“[A] prior art reference cannot anticipate a claimed invention ‘if the allegedly anticipatory disclosures cited as prior art are not enabled.’” *In re Antor Media Corp.*, 689 F.3d 1282, 1289 (Fed. Cir. 2012). “Enablement requires that the prior art reference must teach one of ordinary skill in the art to make or carry out the claimed invention without undue experimentation.” *Elan Pharm., Inc. v. Mayo Found.*, 346 F.3d 1051, 1054 (Fed. Cir. 2003).

Patent Owner argues: “Petitioner does not establish that the PAR enables a POSA to make the claimed sterilized product/article, sterilized CHG composition, or sterilized additives.” PO Resp. 36–37. According to Patent Owner, “[t]he PAR provides no information regarding sterilization of any products or their components, mentions no sterilization processes whatsoever (much less validated ones), and does not describe how to achieve the claimed SALs with any validated sterilization processes.” *Id.* at 37. Patent Owner points to “numerous challenges existing at the time regarding making sterilized chlorhexidine” and argues that “Petitioner offers no explanation how other prior art enables a POSA to make the claimed sterilized CHG composition . . . when the PAR itself does not suggest sterilization whatsoever.” *Id.* at 37–38. Finally, Patent Owner argues that Petitioner’s assertions of enablement are “belied by its own admissions” that it “‘overcame the ‘impossible’ when it released a fully sterilized ChloroPrep product, which, according to Petitioner, required ‘6 years,’ ‘Millions of dollars,’ and ‘>50,000 R&D hours.’” *Id.* at 38 (citing Ex. 2007, 15, 17).

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As an initial matter, it is Patent Owner’s burden to demonstrate that the ChloroPrep PAR is not enabled. *Sasse*, 629 F.2d 675; *Antor Media Corp.*, 689 F.3d 1282; *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1355 n.22 (Fed. Cir. 2003). Patent Owner has not carried its burden to do so.

The evidence supports Petitioner’s assertion that “sterilization of the applicator, via, for instance ETO was a well-known and routine process.” Pet. 51; Ex. 1003 (unrebutted testimony of Dr. Dabbah that a person of ordinary skill in the art would be very familiar with terminal sterilization processes, such as using ETO, and would consider them routine); Ex. 2015 (Chiang teaching that ChloroPrep was sterilized using ethylene oxide); *see also* Ex. 1040, 141:18–147:21 (Dr. Rutala testimony discussing sterilization using ETO).

The evidence also supports that a person of ordinary skill in the art would have been able to sterilize CHG based on the disclosure of the ChloroPrep PAR and what was known in the art without undue experimentation. As discussed *supra* § III.A.2.b, Degala describes a prior art sterilization process for CHG. Ex. 1007 ¶ 2 (“A known antiseptic solution containing [CHG] . . . is sterilized for EU countries *using a known sterilization method*.”). In addition, Degala discloses an allegedly improved sterilization process that addresses the “need in the art” for a sterilizing process with a “shorter, more efficient processing time.” *Id.* ¶¶ 5–7. This support a conclusion that the ChloroPrep PAR was enabled.

We recognize the evidence identified by Patent Owner regarding the challenges of developing sterilized CHG. Ex. 2007, 15, 17. In the absence of a disclosed method for sterilizing CHG, these concerns might be



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persuasive. But here, methods for sterilizing CHG were known and disclosed in the Degala patent.<sup>13</sup> *United States v. Telectronics, Inc.*, 857 F.2d 778, 785, 8 USPQ2d 1217, 1223 (Fed. Cir. 1988) (“The test of enablement is whether one reasonably skilled in the art could make or use the invention from the disclosures in the patent coupled with information known in the art without undue experimentation.”).

Considering all of the evidence of record, the purported deficiencies in the ChloraPrep PAR’s disclosure identified by Patent Owner, and the evidence that Petitioner expended considerable effort in developing a method of sterilizing CHG, do not overcome the presumption that the ChloraPrep PAR is enabled. This is particularly true given the knowledge in the art regarding terminal sterilization and sterilization of CHG.

*B. Alleged Obviousness of Claims 1–3, 5–8, and 10–19 in View of ChloraPrep PAR*

Petitioner contends claims 1–3, 5–8, and 10–19 would have been obvious to a person of ordinary skill in the art at the time of the invention, in view of ChloraPrep PAR and relies on the same arguments asserted in its anticipation challenge, plus the assertion that if certain of the limitations

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<sup>13</sup> Based on what was known in the art, the challenges reflected in Petitioner’s purported admission appear to relate not to sterilizing CHG, but to finding a “shorter, more efficient” method for doing so. *See* Ex. 1007 ¶¶ 3, 5 (describing a “known method of sterilization” that occurs over 24–31 hours and identifying an “unmet need in the art for a method . . . that has a shorter, more efficient processing time”). Moreover, the disclosure that Patent Owner cites to support that it took Petitioner six years and millions of dollars to develop a sterilization method itself cited Degala, suggesting that the method that took such effort to develop may, in fact, be the method disclosed in Degala. Ex. 2007, 16 n.1; Ex. 1007 code (71) (Degala, identifying “CAREFUSION 2200, INC” as the applicant).

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recited in the challenged claims are not anticipated, they would have been obvious. Pet. 51–55. Patent Owner disagrees, arguing, *inter alia*, that the reference does not teach or suggest “a sterilized chlorhexidine gluconate composition” because “Petitioner’s vague reference to unidentified standards and guidelines” does not “transform[] the word ‘sterile’ to a requirement that the ChloraPrep product and its components ‘must’ be ‘subjected to validated sterility processing.’” PO Resp. 30 (citing Pet. 52), *see generally id.* at 40–47. For the reasons that follow, we determine Petitioner has shown by a preponderance of the evidence that the challenged claims would have been obvious to a person of ordinary skill in the art at the time of the alleged invention in view of the ChloraPrep PAR under 35 U.S.C. § 103.

*1. Analysis of Challenged Claims 1–3, 5–8, and 10–19*

As discussed above, Petitioner has demonstrated sufficiently that ChloraPrep PAR discloses all elements of the challenged claims. We find that Petitioner’s arguments that the ChloraPrep PAR renders obvious “a sterilized chlorhexidine product” and “a sterilized chlorhexidine gluconate composition” provide an additional basis on which the challenged claims are unpatentable.<sup>14</sup>

In addition to the evidence introduced as part of its anticipation ground, Petitioner contends that to the extent “the disclosures referring to the antiseptic solution containing CHG, the applicator[,], or the ChloraPrep with

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<sup>14</sup> As noted above, we do not determine whether the preambles of claims 1 and 12 are limiting because, regardless of whether the preamble is limiting, Petitioner has shown that the recitation in the preamble is satisfied by the prior art.

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Tint product as ‘sterile’ do not disclose that the elements (or product/article) have been ‘sterilized,’” it would have been obvious to a person of ordinary skill in the art at the time of the invention that “a product described as ‘sterile’ in a regulatory document such as a PAR must have each component subjected to validated sterility processing that renders the product free of viable microorganisms.” Pet. 52. Petitioner also asserts that to the extent the ChloraPrep PAR does not disclose the SAL recited in claim 10 and 20, it would have been obvious “to sterilize the components of the product described as ‘sterile’ in the *ChloraPrep PAR* within the required SAL range in order to comply with the relevant standards,” for the reasons discussed in connection with its anticipation argument.

Petitioner bases its obviousness position largely on the requirements in the relevant UK standards published as regulatory document, EN 556-1. *Id.* (citing Ex. 1003 ¶ 144); Tr. 11:7–9, 23:24–25:25, 28:6–25; *see also* Reply 12–13 (anticipation argument citing Ex. 1048–1049; Ex. 1037 ¶¶ 4–6; Ex. 1038 ¶¶ 6–17). According to Petitioner, “[i]f any component or subcomponent of the product had not been subjected to such a process, the entire product or solution could not be described as ‘sterile’ as it would contaminate the larger whole.” Pet. 52. Petitioner further argues that per the UK standard, EN 556-1, “each component must be sterilized to a SAL of  $10^{-6}$ .” Reply 13 (citing Ex. 1017, 8 in connection with anticipation ground).

Petitioner relies on the testimony of its declarant, Dr. Dabbah, to support its position. Pet. 53. Dr. Dabbah testifies that a sterility assurance level (“SAL”) of “ $10^{-3}$  is a well-established baseline for products,” and “a SAL of  $10^{-6}$  is a well-established and universally recognized requirement for

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describing a product—as is done in the *ChloraPrep PAR*—as ‘sterile.’” Ex. 1003 ¶ 145 (testimony relating to SAL recited in claims 10 and 20) citing Ex. 1017, 8, 13); *see also, id.* ¶ 144 (testimony on claims 1 and 12). Dr. Dabbah further testifies “it would have been obvious to a POSA to sterilize the components of the product described in the *ChloraPrep PAR* within the required range. Indeed, a POSA would have considered this to be the only way to describe the device and composition a[s] ‘sterile’ in a UK regulatory document.” *Id.*; *see also* Ex. 1037 ¶ 4 (testimony of Mr. Noble-Clarke regarding application of BS EN556-1 to ChloraPrep UK products); Ex. 1045 (email from Mr. Noble-Clarke regarding same). Petitioner argues that although “not applicable to a UK medical device, the relevant FDA guidelines for a device labeled as ‘sterile’ are practically identical to the UK standard, and were issued in draft form on December 12, 2008 and issued on January 21, 2016.” Pet. 53–54 (citing Ex. 1028). According to Petitioner, under the section “Sterilization Information for Devices Labeled as Sterile,” the FDA guidelines provide that “[t]he sponsor should state the sterility assurance level (SAL) of  $10^{-6}$  for devices labeled as sterile unless the device is intended only for contact with intact skin. FDA recommends a SAL of  $10^{-3}$  for devices intended only for contact with intact skin.” *Id.* at 54 (citing Ex. 1028, 8–9) (alteration in original). Petitioner concludes that “even if Patent Owner contends that ‘sterile’ does not necessarily refer to the claimed SAL, it would have been obvious to a POSA to sterilize the claimed components to the required SAL.” Pet. 55.

Patent Owner contends that Petitioner’s obviousness challenge is conclusory and fails for a number of reasons. PO Resp. 39–40. **First**, Patent Owner argues that Petitioner cannot establish the existence of missing

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limitations with “conclusory assertion[s]. . . about general knowledge in the art without evidence on the record, particularly where it is an important structural limitation that is not evidently and indisputably within the common knowledge of those skilled in the art.” *Id.* at 40 (citing *K/S Himpp v. Hear-Wear Techs., LLC*, 751 F.3d 1362, 1365-66 (Fed. Cir. 2014); *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1362 (Fed. Cir. 2016)).”

**Second**, Patent Owner contends Petitioner has not established “that the bare use of the word ‘sterile’ in 2010 in ChloraPrep PAR means that any chlorhexidine gluconate composition had been sterilized.” *Id.* Patent Owner asserts that “Petitioner’s vague reference to unidentified ‘standards and guidelines’” does not establish obviousness or the requisite knowledge in the art. *Id.* (citing Pet. 52; Ex. 2023 ¶¶ 325–329). According to Patent Owner, “[t]here is no evidence that any ‘standard and guideline’ transforms the word ‘sterile’ to a requirement that the ChloraPrep product and its components ‘must’ be ‘subjected to validated sterility processing.’” *Id.* (citing Ex. 2023 ¶¶ 327–328). Patent Owner further argues that Petitioner’s “failure of proof is problematic given the ‘difficulty’ and ‘impossibility’ at that time, the numerous outbreaks from contaminated antiseptics, and the nascent state of the art.” *Id.* at 41.

**Third**, Patent Owner contends that Petitioner’s position is undermined by “the FDA’s guidance that advised manufacturers to clarify their labelling, coupled with CareFusion’s 2015 reported label change to indicate that its solution was ‘not sterilized’ (despite including the word ‘sterile’ on its label).” *Id.* at 41 (citing Exs. 2005–2006; Ex. 2009, 26, 34, 43, 50, 57; Ex. 2023 ¶¶ 330–332).

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**Fourth**, Patent Owner contends that, “even if unidentified ‘standards’ compelled a POSA to translate ‘sterile’ to ‘sterilized,’ Petitioner does not explain how that would further compel a POSA to understand that the product, article, or composition would have been subjected to validated sterility processing.” *Id.* (citing Ex. 2023 ¶ 333).

**Fifth**, Patent Owner argues that our Institution Decision cites references (i.e., Degala, Margoosian, or Scholz) that were not explicitly presented in the obviousness challenge in the Petition, and that these references should be ignored. *Id.* at 42; Sur-Reply 18–19. Patent Owner states that the obviousness arguments in the Petition “focus solely on regulatory ‘standards’ – not knowledge based on the prior art references,” and therefore, Petitioner should be limited to only what is in the Petition. PO Resp. 42–43. Even relying on these references, Patent Owner asserts, Petitioner cannot establish obviousness. *Id.* at 43 (citing Ex. 2023 ¶¶ 346–347). According to Patent Owner, “**Scholz** reflects the then-existing misconception that antiseptics need not be sterilized and describes no methods for sterilizing CHG compositions but mentions sterilizing packaging.” *Id.* at 44. Patent Owner asserts that “Petitioner’s own testing of Margoosian established that Margoosian ‘results in a solution that is not sterile’—despite suggesting the contrary in 2015.” *Id.* As to Degala, Patent Owner asserts that it “documents the ongoing uncertainty regarding existing sterilization methods and describes neither a sterilized product or article or any validated sterility processing.” *Id.*

**Finally**, Patent Owner asserts that the field was nascent and none of the cited references describe a CHG composition “subjected to a suitable

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sterilization process such that sterility can be validated.” PO Resp. 44  
(citing Ex. 2023 ¶¶ 104, 310, 412); Sur-Reply 20.

For the reasons discussed *supra* § III.A, we find that Petitioner has established, by a preponderance of the evidence, that a person of skill in the art would have understood the use of the word “sterile” in 2010 in ChloraPrep PAR to mean that the things labeled “sterile” – i.e., “ChloraPrep with Tint,” the “sterilized alcoholic antiseptic solution,” and the “applicators” – had been sterilized, as required by the challenged claims. In addition, Petitioner has established by a preponderance of the evidence that it would have been obvious to one of skill in the ordinary art at the time of the invention to sterilize the things labeled “sterile” in the ChloraPrep PAR.

Specifically, as discussed *supra* §§ III.A.2.a. and III.A.2.b, Petitioner has shown that “some degree of sterilization [was] required in European Union (EU) countries” (*see* Ex. 1007 ¶ 2) and that its ChloraPrep products sold within the United Kingdom (UK) were subject to UK regulatory requirements as outlined in EN 556-1. *See* Ex. 1003 ¶ 144; Ex. 1017; Ex. 1037 ¶¶ 1–12; Ex. 1038 ¶¶ 6–16. The EN 556-1 standard states that a product can be designated as “sterile” only if it had undergone a validated sterilization process. *See* Ex. 1017, 4. Moreover, as discussed *supra* §§ III.A.2.a and III.A.2.b, the evidence supports that a person of ordinary skill in the art would have been aware of the standards for calling a product “sterile” in a regulatory document and thus motivated to follow them. Ex. 1003 ¶¶ 71, 91, 129–134, 144–145; Ex. 1017; *see also*, Ex. 1040, 199:24–200:18 (Dr. Rutala testimony that “I would agree that it’s likely that a POSA would be aware of ISO standards. And likely, they would be aware of the

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ISO standards for steam sterilization or moist heat as well as ethylene oxide, dry heat”).

Additionally, the testimony of Dr. Dabbah establishes that it was within the knowledge of one of ordinary skill in the art at the time of the invention (i.e., Nov. 25, 2015) to sterilize the chlorhexidine gluconate composition individually in the ChloraPrep product using techniques such as that disclosed by Degala in July 2015. *See* Ex. 1003 ¶ 76; Ex. 1007 ¶¶ 2–4, 7, 28, 30, 50. We credit the testimony of Dr. Dabbah that prior art references such as Degala (Ex. 1007) are indicative of the level of skill and the knowledge possessed by an ordinary artisan at the relevant time. *See* Ex. 1003 ¶¶ 73–75; *Standard Oil Co. v. Am. Cyanamid Co.*, 774 F.2d 448, 454 (Fed. Cir. 1985) (“The issue of obviousness is determined entirely with reference to a hypothetical ‘person having ordinary skill in the art.’ It is only that hypothetical person who is presumed to be aware of all the pertinent prior art.”).

Furthermore, given the disclosures of Degala (Ex. 1007), we do not agree with Patent Owner that the field of chlorhexidine gluconate sterilization was a nascent field. Rather, Degala explicitly states that CHG can be sterilized using a “known method” and presents an improvement on that method. Ex. 1007 ¶¶ 3, 7. Degala also discloses the results of testing to determine how long it took to reach a SAL of  $10^{-6}$  for a CHG solution sterilized at three different temperatures. *Id.* ¶ 52. Thus, Degala supports our finding that CHG sterilization was a developed field. Although not necessary to this determination, we note that for the reasons discussed *supra* § III.A.2.b, Scholz also supports that it was known that CHG could be



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sterilized using “a variety of industry standard techniques.” Ex. 1008 ¶ 178.<sup>15</sup>

For the reasons discussed *supra* § III.A.2.a, the evidence also supports that a person of ordinary skill in the art would have known how to terminally sterilize the product disclosed in the ChloroPrep PAR and would have considered it routine to do so. *See, in particular, discussion of* Ex. 1003 ¶ 138; Ex. 2015 ¶ 10; Ex. 1040, 141:18–143:6, 145:2–147:21 190:6–20; Ex. 2023 ¶ 206; *see also*, Ex. 1003 ¶ 71 (discussed *supra* § III.A.2.b). Accordingly, we find that a person of ordinary skill in the art would have known how to sterilize the entire product described in the ChloroPrep PAR.

The evidence of record also supports that a person of ordinary skill in the art would have had a reasonable expectation of success. As discussed *supra* § III.A.2.b, the record supports that a person of ordinary skill in the art would have known of the existence of a product containing sterilized CGH. *See, in particular, discussion of* Ex. 1005, Ex. 1007 ¶ 2; Ex. 1044, 41; Ex. 1037 ¶¶ 2, 7; Ex. 1038 ¶¶ 3, 4, 6, 10. In addition, the record supports that a person of ordinary skill in the art would have known of the existence of terminally sterilized CHG products. For example, as discussed *supra* § III.A.2.a, Chiang discloses terminal sterilization of CareFusion’s ChloroPrep applicator using ethylene oxide. Ex. 2015 ¶ 10. The knowledge of terminally sterilized products and products with sterilized CHG solutions, coupled with the knowledge of methods of sterilizing, supports that a person of ordinary skill in the art would have had a reasonable expectation of

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<sup>15</sup> As the record already includes ample support for our finding that a person of ordinary skill in the art would have known how to sterilize CHG, we need not determine here whether Margoosian further supports this finding.

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success in sterilizing all of the things labeled “sterile” in the ChloraPrep PAR.

In sum, we find that given the UK regulatory requirements, a person of ordinary skill in the art would have been motivated to “sterilize” the things described in the ChloraPrep PAR as “sterile” – i.e., the “alcoholic antiseptic solution,” the “applicator,” and the “ChloraPrep with Tint” product itself. Ex. 1003 ¶¶ 144–145. We also find that a person of ordinary skill in the art would have known how to sterilize each of the things described in the ChloraPrep PAR as “sterile” to the SAL recited in claims 10 and 20, and that a person of ordinary skill in the art would reasonably have expected success in doing so.

We turn now to Patent Owner’s arguments. **First**, we are not persuaded by Patent Owner’s arguments that Petitioner has not established that it would have been obvious to sterilize CHG because Petitioner relies on “conclusory assertion[s] . . . about general knowledge in the art without evidence on the record.” Petitioner and its expert, Dr. Dabbah, provided more than mere conclusory assertions about the general knowledge in the art at the critical time. The circumstances here are distinguishable from *K/S Himpp*, because here, to the extent the ChloraPrep PAR does not disclose a sterilized product with a sterilized CHG solution, it includes an explicit suggestion that they should be “sterile.” *See, e.g.*, Ex. 1005, 7. Furthermore, the record here is not limited to “general knowledge,” but includes specific teachings of products having sterilized CHG and terminally sterilized products having CHG compositions.

**Second**, Patent Owner’s argument that Petitioner’s obviousness challenge fails because it relies on “vague reference to unidentified

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‘standards and guidelines,’” is also unpersuasive. The evidence of record includes specific standards and guidelines, including BS EN 556-1 and corresponding FDA guidelines. *See* Ex. 1017; Ex. 1028. In addition, Dr. Rutala confirmed that a SAL of  $10^{-6}$  is the common, widely accepted standard for designating a component or device as “sterile.” *See* Ex. 1040, 235:16–237:22; *see* Ex. 1013 (ISO 11137-1 International Standard for “Sterilization of health care products—Radiation”), 13.

**Third**, Patent Owner’s arguments regarding the FDA’s guidance and CareFusion’s 2015 label change are irrelevant, because Petitioner’s obviousness arguments are premised on (1) a ChloraPrep regulatory document relating to a product sold within the United Kingdom and (2) the knowledge of those of ordinary skill in the art as demonstrated by evidence found in EN 556-1 (Ex. 1017), Degala (Ex. 1007), and Scholz (Ex. 1008).

**Fourth**, we do not agree with Patent Owner’s argument that Petitioner does not explain how the evidence of record would further compel a person of ordinary skill in the art to understand that the product, article, or composition would have been subjected to validated sterility processing. We do not understand Petitioner to argue that it would have been obvious that the product described in the ChloraPrep PAR had been sterilized. Rather, Petitioner argues that, to the extent the product described in the ChloraPrep PAR is found not to be sterilized, it would have been obvious to sterilize it. Pet. 56 (“Thus, even if Patent Owner contends that ‘sterile’ does not necessarily refer to the claimed SAL, it would have been obvious to a POSA to sterilize the claimed components to the required SAL.”).

**Fifth**, we do not agree with Patent Owner’s arguments that Petitioner’s evidence regarding the Degala, Margoosian, and Scholz

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references should be ignored because these references are not argued explicitly in the Petition as part of Petitioner’s first obviousness challenge. *See* PO Resp. 42; Sur-Reply 18–19. Petitioner’s challenge asserts that its ChloraPrep product was sold within the United Kingdom and person of ordinary skill in the art at that time would have known the composition was sterilized as demonstrated by evidence found in EN 556-1 (Pet. 52; Ex. 1003 ¶ 144 (citing Ex. 1017)). Degala (Ex. 1007) is part of the basis for Petitioner’s second obviousness challenge, but it explicitly references regulatory standards in the EU, which supports Petitioner’s arguments regarding EN 556-1. Petitioner explains this in its at Reply, which is appropriate rebuttal argument. Reply 8, 23. Additionally, “a person of ordinary skill in the art is a hypothetical person who is presumed to know the relevant prior art.” *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). Moreover, we do not agree with Patent Owner’s characterization of Degala and Scholz. *See* PO Resp. 43. As discussed above, Degala and Scholz support that the person of ordinary skill in the art would have known how to sterilize CHG compositions.

**Finally**, as discussed *supra* § III.A.2.a, applicable standards required a specific SAL and Dr. Rutala conceded that “you have to have a validated sterility process to have a sterility assurance level.” Ex. 1043, 159:20–25. Accordingly, we are not persuaded by Patent Owner’s argument that none of the cited references describe a CHG composition “subjected to a suitable sterilization process such that sterility can be validated.” PO Resp. 44. For these reasons, we find that all the limitations of claims 1–3, 5–8, and 10–19 were taught or suggested at the critical time in view of the ChloraPrep PAR.

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Before reaching a final conclusion regarding Petitioner’s obviousness challenge to the ’067 patent, however, we consider Patent Owner’s objective indicia evidence to determine if it outweighs Petitioner’s showing regarding the ChloroPrep PAR.

## 2. *Analysis of Objective Indicia of Non-Obviousness*

Factual inquiries for an obviousness determination include an evaluation and crediting of objective evidence of nonobviousness. *See Graham*, 383 U.S. at 17. Objective evidence of non-obviousness “may often be the most probative and cogent evidence in the record” and “may often establish that an invention appearing to have been obvious in light of the prior art was not.” *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349 (Fed. Cir. 2012). Thus, notwithstanding what the teachings of the prior art would have suggested to one skilled in the art, secondary considerations (objective evidence of nonobviousness) may lead to a conclusion that the challenged claims would not have been obvious. *In re Piasecki*, 745 F.2d 1468, 1471–72 (Fed. Cir. 1984). Objective indicia of non-obviousness can include any of the following: long-felt but unsolved needs, failure of others, unexpected results, commercial success, copying, licensing, and praise. *See Graham*, 383 U.S. at 17; *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007).

In order to accord substantial weight to objective evidence of nonobviousness, “the evidence of secondary considerations must have a ‘nexus’ to the claims, i.e., there must be ‘a legally and factually sufficient connection’ between the evidence and the patented invention.” *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1332 (Fed. Cir. 2019)

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(quoting *Demaco Corp. v. F. Von Lang-sdorff Licensing Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988)). Although the patent owner bears the initial burden of proving a nexus (*WMS Gaming Inc. v. Int’l Game Tech.*, 184 F.3d 1339, 1359 (Fed. Cir. 1999)), a presumption of nexus may be appropriate if the patent owner shows “the asserted objective evidence is tied to a specific product and that product ‘embodies the claimed features, and is *coextensive with them.*’” *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (quoting *Polaris Indus, Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1072 (Fed. Cir. 2018) (quoting *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1130 (Fed. Cir. 2000) (emphasis added))). The coextensive requirement does not require a patentee to prove perfect correspondence between the product and a patent claim. *Teva Pharms. International GmbH v. Eli Lilly and Company*, 8 F.4th 1349, 1361 (Fed. Cir. 2021) (quoting *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1332 (Fed. Cir. 2019)). On the other hand, “[w]hen the [product] is not coextensive with the patented invention—for example, if the patented invention is only a component of a commercially successful machine or process,” the patent owner is not entitled to a presumption of nexus. *Demaco*, 851 F.2d at 1392.

Here, we find nexus because the ’067 patent claims are embodied by and coextensive with the ChloroPrep product. *See* Ex. 1030 ¶¶ 17–45; *see also* Section III.A. (finding the ’067 patent claims anticipated by ChloroPrep PAR). Regardless of whether we find a nexus our ultimate conclusions regarding each of Patent Owner’s alleged objective indicia of non-obviousness would not change.

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Regarding the specific objective indicia of non-obviousness, Patent Owner argues that long-felt but unresolved need, skepticism and failure of others, industry praise, and commercial success linked to the invention indicates that the claims would not have been obvious to a person of ordinary skill in the art. PO Resp. 58–68.

*a) Long-Felt but Unsolved Need*

Patent Owner argues that the inventors of the '067 Patent “solved a long-felt but unmet need for a sterilized chlorhexidine product that allows for the containment, delivery, and application of a sterilized CHG composition.” PO Resp. 58. Patent Owner also argues that the industry “was very concerned about mitigating ongoing outbreaks and deaths due to contaminated antiseptic products.” *Id.* (citing Ex. 2023 ¶¶ 421–423; Ex. 2003). And, according to Patent Owner, to address mounting concerns, the FDA convened hearings in 2012 to address whether sterilization should be required. *Id.* Patent Owner asserts that “[d]uring the hearings, numerous stakeholders commented on the ‘technical challenges’ associated with sterilizing antiseptics including comments that sterilization would be ‘impossible or impractical.’” *Id.* at 58–59 (citing Ex. 2023 ¶¶ 423–424; Ex. 2002, 23, 25; Ex. 2004, 2172; Ex. 2007, 14–15, 17). Patent Owner further asserts that “industry representatives emphasized the challenges these processes entailed and the difficulties of achieving sterility” with CHG being “known as particularly problematic.” *Id.* at 59 (citing Ex. 2002, 24; Ex. 2023 ¶¶ 425–426).

We are not persuaded. To establish a long-felt need, three elements must be proven: First, the need must have been a persistent one that was recognized by ordinarily skilled artisans. *In re Gershon*, 372 F.2d 535, 538

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(CCPA 1967). Second, the long-felt need must not have been satisfied by another before Appellant's invention. *See Newell Companies, Inc. v. Kenney Mfg. Co.*, 864 F.2d 757, 768 (Fed. Cir. 1988). Third, the invention must, in fact, satisfy the long-felt need. *In re Cavanagh*, 436 F.2d 491, 496 (CCPA 1971). Patent Owner's argument is lacking as to all elements. The articles cited by Patent Owner range from 2007 to 2012 but fail to account for the disclosure in Degala that demonstrates sterilization of a chlorhexidine gluconate composition was known and being improved upon by 2015. *See* Ex. 1007 ¶¶ 2, 3, 7, 50, 52. *Newell Companies*, 864 F.2d at 768 (“[O]nce another supplied the key element, there was no long-felt need or, indeed, a problem to be solved.”). And, Patentee's expert stated he was unaware of any evidence of long-felt need or skepticism after the publication of Degala. *See, e.g.*, Ex. 1040, 309:7–310:20; 307:16–308:17.

Patent Owner's citations to a marketing brochure of a product being released in 2019 in the U.S. do not alter the fact that methods of sterilizing CHG compositions were known and that a product including a sterilized CHG composition was being sold in the UK. *See* PO Resp. 60–61 (citing Ex. 2007, 14, 17); Ex. 1007 ¶ 2; Ex. 1044, 41; Ex. 1007 ¶ 2; Ex. 1037 ¶¶ 1–7; Ex. 1038 ¶ 6. Additionally, Scholz teaches that products containing chlorhexidine gluconate compositions may be terminally sterilized by known techniques (Ex. 1008 ¶ 178) and Chiang teaches that CareFusion's ChloroPrep applicator, which included a CHG composition, was terminally sterilized using ethylene oxide (Ex. 2015 ¶ 10). These disclosures further indicate there was not a long-felt but unmet need in the industry.

Accordingly, we give little weight to Patent Owner's argument that there was a long-felt but unmet need.



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*b) Skepticism in the Industry*

Patent Owner argues there was concern among manufacturers of sterilized antiseptics that the “FDA would impose a requirement that topical antiseptics be sterilized because they were skeptical that [a person of ordinary skill in the art] could develop sterilized antiseptic products. *See* PO Resp. 61 (citing Ex. 2023 ¶¶ 435–440). According to Patent Owner, “[m]any comments from the FDA hearings were directed to the challenges associated with manufacturing sterilized antiseptics.” *Id.* Patent Owner cites to a 2013 article from The Society for Healthcare Epidemiologists, which “agree[d] that products used for aseptic procedures need be sterile, however, it acknowledge[d] that sterilization of topical antiseptics is problematic.” *Id.* (citing Ex. 2002, 10). Patent Owner notes that the 2013 article “urge[d] FDA to engage manufacturers however on the possible technical limitations of sterilization of select topical antimicrobials such as chlorhexidine gluconate (CHG).” *Id.*

For the same reasons discussed above with regard to “long felt but unmet need,” we are unpersuaded by Patent Owner’s position. Accordingly, we give little weight to Patent Owner’s argument that there was skepticism in the industry.

*c) Failure of Others*

Patent Owner argues that a person of ordinary skill the art would have recognized that, “at the time of the invention, others tried and failed to develop sterilized chlorhexidine products and articles including sterilized CHG and the field was nascent.” PO Resp. 63 (citing Ex. 2023 ¶¶ 441–447.) Patent Owner cites to the ’067 Patent, Degala, and Margoosian to bolster its argument that “there were many challenges faced by [a person of ordinary

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skill the art] in trying to create sterilized CHG products and articles including the potential for degradation” and that others failed to describe or create “any validated methods for sterilizing CHG compositions.” *Id.* at 63–64 (citing Ex. 1001, 14:42–45; 17:14–18; Ex. 1007 ¶¶ 3–4; Ex. 2023 ¶¶ 444–446; Ex. 2035, 7–8).

For the same reasons discussed above with regard to “long felt but unmet need,” we are unpersuaded by Patent Owner’s position. Accordingly, we give little weight to Patent Owner’s argument that there was failure of others in the industry.

*d) Industry Praise and Commercial Success of the ChloroPrep USA Product*

Patent Owner contends that Petitioner’s fully-sterilized ChloroPrep products released in the United States in 2019 are covered by the claims of the ’067 Patent and quickly became successful. PO Resp. 64–65 (citing Ex. 1030, 8–16; Ex. 2041, 97, 98–103; Exs. 2026–2030). According to Patent Owner, “the difference between Petitioner’s original [unsterilized] products and the fully-sterilized ones are the invention itself—fully sterilized products with sterilized CHG composition”—which demonstrates the commercial success of the ’067 patent. *Id.* at 66 (citing Ex. 2025; Ex. 2031, 4, 7, 12).

Patent Owner argues that “[d]espite the impact of COVID-19 on elective surgeries, Petitioner’s fully-sterilized ChloroPrep product generated millions in revenue after launch in 2019.” *Id.* at 66–67 (citing Ex. 2023 ¶ 451; Ex. 2026, 3 (over ██████ in FY 2020); Ex. 2027, 4 (over ██████ in FY 2021); Ex. 2028, 2 (over ██████ from FY Dec. 2021-FY Nov. 2022); Ex. 2029 (high volume of sales by customer)). Indeed, according to Patent

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Owner, from April 2020 to March 2021, Petitioner captured over half of the U.S. market for preoperative skin preparation products with its sterilized products. *Id.* at 67 (citing Ex. 2030, 2). Patent Owner further argues that upon recognizing the value of the invention, Petitioner initiated a plan to discontinue its non-sterilized products and [REDACTED] for its fully-sterilized products. *Id.* (citing Ex. 2031, 8, 11).

We agree that the market share and sales information presented by Patent Owner demonstrates considerable sales of the ChloroPrep USA products within the U.S. market. We do not agree, however, that Petitioner's release of its ChloroPrep UK product into the U.S. market demonstrates commercial success for several reasons.

As an initial matter, Dr. Rutala testified that there could be many factors beyond the use of the invention that contributes to revenue or units sold but that he did not evaluate those other factors because "[he] didn't have the information nor would [he] know how to use it if [he] had it." *See* Ex. 1040, 292:9–293:8.

Moreover, Sean Sheridan, Ph.D. ("Dr. Sheridan") testified that "the introduction of the Sterilized ChloroPrep products did not lead to any material change in sales of ChloroPrep products which were significant and growing for years prior to Q4 2019." *See* Ex. 1039 ¶ 33; *see also, id.* ¶ 30 (Dr. Sheridan's testimony that the release of the sterilized U.S. product did not result in "materially different" unit sales than would have been expected based on sales of the unsterilized U.S. product). Dr. Sheridan further testified that "[t]he profitability data in the documents cited by Dr. Rutala indicate that the introduction of the Sterilized ChloroPrep products [REDACTED]  
[REDACTED]

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 *Id.* ¶ 35. Dr. Sheridan went on to testify that “the introduction of the Sterilized ChloraPrep products appears to be correlated with a decrease in BD’s share of the relevant market.” *Id.* ¶ 39. We credit Dr. Sheridan’s testimony.

Accordingly, we give little weight to Patent Owner’s argument that sales of the ChloraPrep USA products demonstrate commercial success.

For industry praise, Patent Owner relies on the marketing materials accompanying the release of Petitioner’s sterilized U.S. product, arguing:

Petitioner has touted its sterilized products as “[n]ew, advanced technology” with “the lowest risk of intrinsic contamination available.” . . . And in its marketing materials, Petitioner praised its product development, telling customers that “[s]terilizing antiseptic solutions is a difficult challenge” and that “manufacturers have asserted . . . is ‘impossible or impractical’” because “[c]onventional terminal sterilization processes . . . are not compatible with common antiseptics, including CHG and can damage the chemical integrity of the active ingredient.”

PO Resp. 65 (citing Ex. 2007, 4, 14, 15). Petitioner’s marketing puffery does not weigh heavily in our analysis because the evidence supports that it was selling a product including a sterilized CHG composition well before the introduction of its sterilized U.S. product. Moreover, to the extent there was a technology advance accompanying the launch of Petitioner’s sterilized U.S. product, the advance appears to relate not to the ability to sterilize CHG, but to a method for doing so with a “shorter, more efficient processing time.” *See* Ex. 1007 ¶¶ 2, 5, 7 (describing known sterilization method and improved method addressing the need for a “shorter, more efficient” method). In this regard, we note that the challenged claims do not restrict the method by which CHG is sterilized.

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*e) Summary of Analysis of Objective Indicia of Non-Obviousness*

Patent Owner has demonstrated a sufficient nexus between the claimed invention and the ChloroPrep UK products. For the reasons discussed above, however, we give little weight to Patent Owner's assertions that the claimed invention satisfies a long-felt but unmet need for the claimed invention, was met by skepticism, was preceded by the failure of others to develop similar products, enjoyed commercial success, or was received with praise in the industry.

*3. Conclusion on Claims*

As discussed above, the record supports that a person of ordinary skill in the art would have had reason to comply with relevant standards, that it was known how to sterilize CGH and how to terminally sterilize a product using, e.g., ethylene oxide, and that it was known that there were products on the market that had been terminally sterilized and that included sterilized CGH. Considering this evidence together with the objective indicia of non-obviousness presented by Patent Owner, we find that the preponderance of the evidence supports that it would have been obvious to sterilize everything identified as "sterile" in the ChloroPrep PAR.

*4. Conclusion*

For the foregoing reasons, we find Petitioner has proven by a preponderance of the evidence that ChloroPrep PAR teach or suggest all elements of challenged claims 1–3, 5–8, and 10–19 of the '067 patent. Furthermore, we find that the use of the ChloroPrep PAR would have been within the level of ordinary skill in the art, as evidenced by the prior art of record. We, therefore, conclude Petitioner has demonstrated by a preponderance of the evidence that claims 1–3, 5–8, and 10–19 would have

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been obvious in view of ChloraPrep PAR, and thus, are unpatentable under 35 U.S.C. § 103.

*C. Alleged Obviousness of Claims 1–3, 5–8, and 10–19 in View of ChloraPrep PAR and Degala*

Petitioner contends claims 1–3, 5–8, and 10–19 would have been obvious to a person of ordinary skill in the art at the critical time in view of ChloraPrep PAR and Degala. Pet. 55–64. Patent Owner disagrees, arguing, *inter alia*, that the combination of references does not cure the problem with ChloraPrep PAR because PAR does not disclose the “sterilized” limitation[s].” PO Resp. 47–54. Patent Owner also argues that Petitioner fails to explain why a person of ordinary skill in the art would have been motivated to combine ChloraPrep PAR and Degala or why there would be a reasonable expectation of success. *Id.* at 54–57. As discussed in detail below, we find Petitioner has demonstrated by a preponderance of the evidence that challenged claims 1–3, 5–8, and 10–19 would have been obvious to a person of ordinary skill in the art under 35 U.S.C. § 103 in view of ChloraPrep PAR and Degala.

*1. Analysis of the Challenged Claims*

*a) Claims 1 and 12*

Petitioner relies on its arguments regarding ChloraPrep PAR in addition to Degala’s disclosure when contending that the combined teachings of ChloraPrep PAR and Degala would have rendered challenged claims 1 and 12 obvious to a person of ordinary skill in the art at the critical time. Pet. 55–65 (citing Ex. 1003 ¶¶ 148–166). Petitioner argues that in addition to the ChloraPrep PAR’s disclosure, Degala provides a detailed description of a method to sterilize an “antiseptic solution”:

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[T]he method for sterilizing an antiseptic solution comprises providing a container containing the antiseptic solution . . . ; selecting a sterilization temperature from about 85° C. to about 135° C. and a sterilization time from about 1 minute to about 19 hours; heating the antiseptic solution to the selected sterilization temperature; maintaining the antiseptic solution at the selected sterilization temperature for the selected sterilization time; and terminating the heating of the antiseptic solution when the selected sterilization time expires.

*Id.* at 56 (citing Ex. 1007 ¶ 7). According to Petitioner, “Degala teaches that this process can be used with an antiseptic solution that ‘comprises about 70% v/v isopropanol in water and about 2.0% w/v chlorhexidine gluconate,’” which Petitioner contends is “the same solution described in the ChloraPrep PAR.” *Id.* (citing Ex. 1007 ¶ 16). And, Petitioner asserts that Degala teaches that “‘the container may be made of a frangible material such that upon application of sufficient force the container fractures,’ which again is consistent with the ChloraPrep PAR.” *Id.* (citing Ex. 1007 ¶ 26). Petitioner also asserts that “Degala discusses the ChloraPrep product as embodied in the ChloraPrep PAR and states that is ‘sterilized for EU countries using a known sterilization method.’” *Id.* at 58 (citing Ex. 1007 ¶ 2).

Petitioner contends that “Degala’s disclosure in totality refers to means of sterilization to achieve a sterile condition, including through validated sterility processing that renders the product free of viable microorganisms.” Pet. 57. Petitioner notes that Degala “defines ‘sterile’ based on international requirements for qualification as sterile, stating, ‘[a]s used herein, sterile means ‘7 day sterility’ as tested following the procedures described in U.S. Pharmacopeial Convention (USP) Chapter 55 ‘Biological

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Indicators—Resistance Performance Tests.”” *Id.* (citing Ex. 1007 ¶ 40).

Thus, Petitioner concludes that the combined teachings of ChloroPrep PAR and Degala would have rendered claims 1 and 12 obvious to a person of ordinary skill in the art. *Id.* at 58.

Patent Owner contends that the combination of ChloroPrep PAR and Degala fails to fill numerous missing elements from claims 1 and 12. PO Resp. 48. Patent Owner first argues that Degala does not disclose a sterilized CHG composition that is subject to a suitable sterilization process such that sterility can be validated. *Id.* (citing Ex. 2023 ¶¶ 363, 370–372). According to Patent Owner, a person of ordinary skill in the art would have understood that “passing a sterility test on a particular instance does not mean that a particular sterilization process itself has been validated, i.e., that procedures have been established to show that the process consistently, reliably, and reproducibly results in a product that is sterile (e.g., according to that sterility test).” *Id.* at 49. Patent Owner asserts that the “7-day sterility test” in Degala only “provides a way to check ‘viable spore count’ resulting from a particular process” regardless of whether or not that process was validated. *Id.*

Patent Owner then contends that even if a “sterilized [CHG] composition” were disclosed, “Petitioner failed to establish how the combination discloses a ‘sterilized chlorhexidine product’ or a ‘sterilized chlorhexidine article.’” *Id.* (citing Ex. 2023 ¶¶ 363, 367–369). Patent Owner asserts that “Petitioner glosses over these limitations,” but “in allowing the claims, the PTO emphasized that ‘the prior art does not teach a product which is itself necessarily sterilized and comprising sterilized



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chlorhexidine gluconate as further recited in the claims.” *Id.* (citing Ex. 1002, 99).

Lastly, Patent Owner again argues that a person of ordinary skill in the art at the critical time would not understand “sterile” to mean “sterilized” based on “unidentified ‘international standards regarding sterility.’” *Id.* (citing Pet. 58).

For the reasons detailed above, *see* Sections III.A and B., *supra*, the trial record supports a finding that the ChloraPrep PAR teaches or suggests all the limitations of the challenged claims, including separately sterilizing a chlorhexidine gluconate composition within a product and sterilizing a complete final article. In addition to the teachings of ChloraPrep PAR explained previously, Degala explicitly discloses sterilizing a chlorhexidine gluconate composition via a cascading-water sterilization process and further discloses that the process produces a SAL of  $10^{-6}$ . *See* Ex. 1007 ¶¶ 41, 43, 45, 49, 52, 54, Tables 11, 12, and 14; *see also* Ex. 1040, 325:9–327:22 (Dr. Rutala testifies “Degala teaches a CHG method to achieve sterilization of a CHG composition”). Additionally, as discussed previously, Dr. Rutala conceded that “you have to have a validated sterility process to have a sterility assurance level.” Ex. 1043, 159:20–25.

Taking the complete record into account, including the objective indicia of non-obviousness (discussed *supra* § III.B.2), we find that the combination of ChloraPrep PAR and Degala would have rendered obvious the sterilization of a complete final product that includes a sterilized chlorhexidine gluconate composition. As discussed previously, the ChloraPrep PAR states that the ChloraPrep UK product has both a sterile CHG solution and a sterile applicator. Ex. 1006, 7, 10, 17. Additionally, as

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discussed previously *see* Sections III.A.1., *supra*, terminal sterilization techniques and their use on packaging of products containing chlorhexidine gluconate compositions were well-known and routine as of 2015 ¶ 10. *See* Ex. 1003 ¶ 71; Ex. 1040, 141:18–143:6, 147:10–11, 190:6–20; Ex. 2015; Ex. 1017, Part 1. In fact, the ChloraPrep USA product was subject to termination sterilization in 2015. Ex. 2006.

Therefore, considering the knowledge of those skilled in the art and the regulatory requirements for the ChloraPrep UK product, as well as the other evidence of record, including the objective indicia of non-obviousness, we find that after reading the ChloraPrep PAR and Degala, a person of ordinary skill in the art in at the time of the invention would have found it obvious to sterilize the CHG solution and to terminally sterilize the product described in the ChloraPrep PAR if it had not already been subject to such a process.

Accordingly, based on the entirety of the proceeding record, we conclude Petitioner has demonstrated by a preponderance of the evidence that independent claims 1 and 12 would have been obvious under 35 U.S.C. § 103 in view of ChloraPrep PAR and Degala.

Patent Owner next argues that Petitioner fails “to present any cogent reason why a [person of ordinary skill in the art] would have been motivated to combine [ChloraPrep] PAR and Degala or why there would be a reasonable expectation of success.” PO Resp. 54 (citing Ex. 2023 ¶¶ 403–414). According to Patent Owner, a person of ordinary skill in the art would not have understood a reference “to an unidentified CareFusion product somewhere in the EU in 2014 as a ‘specific reference’ to the ChloraPrep UK products allegedly referenced in a 2010 PAR.” *Id.* at 55 (citing Ex. 2023

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¶¶ 406, 364–65). Patent Owner additionally argues that Degala teaches away from the product in the ChloraPrep PAR because “the product is heavily criticized Paragraphs 3 to 5 due to its numerous ‘undesired impurities’ from ‘overly degrading the antimicrobial molecules.’” *Id.* (citing Ex. 1007 ¶¶ 3–5; Ex. 2023 ¶¶ 407–408). Patent Owner further argues “Petitioner has no evidence that a [person of ordinary skill in the art] would have a reasonable expectation of success at arriving at the claimed inventions given the numerous challenges facing POSAs and the prior failures by others.” *Id.* at 56–57 (citing Ex. 2023 ¶¶ 410–414).

We do not agree with Patent Owner. The record supports a finding that a person of ordinary skill in the art would have had reason to combine the teachings of ChloraPrep PAR and Degala and would have had a reasonable expectation of success in combining the teachings of both references. First, we do not agree that Degala disparages or heavily criticized the ChloraPrep product. *See* Ex. 1007 ¶¶ 3–5. Rather, Degala teaches an improvement upon the method used previously in the industry. *Id.* Based on Degala’s own teachings, we find a person of ordinary skill in the art would have readily applied Degala’s technique to that in the ChloraPrep PAR. An improvement suggested by the prior art is not a teaching away, particularly when the purpose of the prior art is not destroyed, but improved upon. *Ricoh Co., Ltd. v. Quanta Comp. Inc.*, 550 F.3d 1325, 1332 n. 5 (Fed.Cir.2008) (citing *In re Fulton*, 391 F.3d 1195, 1201 (Fed.Cir.2004) (refusing to conclude that prior art disclosure taught away from the claimed invention where the disclosure did not “criticize, discredit, or otherwise discourage the solution claimed”)).

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Second, we credit the testimony of Dr. Dabbah who notes that “Degala expressly references the product discussed in the ChloraPrep PAR, noting prior techniques for sterilizing the solution and ampoule were known and describing additional methods. Therefore, I consider that it would have been obvious to combine these teachings.” Ex. 1003 ¶ 146; *see also* Ex. 1007, code 71 (Applicant: CareFusion 2200, Inc.), ¶ 2 (“A known antiseptic solution containing 2% w/v chlorhexidine gluconate in 70% v/v isopropanol in water, manufactured by CareFusion Corp., is sterilized for EU countries using a known sterilization method.”); Ex. 1005, 4. Lastly, the record is replete with citations indicating that CareFusion, the applicant for Degala, was the company that originally produced the ChloraPrep product. *See* Ex. 2006; Ex. 2008 (FDA website referencing ChloraPrep labels); Ex. 2015 ¶ 8 (“the ChloraPrep® products commercially available from CareFusion”) ¶ 10; Ex. 2016, 12, 13.

Given that (1) Degala teaches that in some jurisdictions, such as EU countries, some degree of sterilization is required, (2) Degala discloses an improved technique for sterilizing a chlorhexidine gluconate composition, (3) Degala was filed by CareFusion, the same company that originally produced the ChloraPrep and (4) per Dr. Dabbah, the composition in Degala is the same one described in ChloraPrep PAR, we find that one skill in the art would have had a reason to and a reasonable expectation of success in combining the teachings of the prior art references. *See Power-One, Inc., v. Artesyn Techs., Inc.*, 599 F.3d 1343, 1351 (Fed. Cir. 2010) (an invention is not obvious just “because all of the elements that comprise the invention were known in the prior art;” rather a finding of obviousness at the time of invention requires a “plausible rational [sic] as to why the prior art

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references would have worked together.”); *Amgen Inc. v. F. Hoffman-LA Roche Ltd.*, 580 F.3d 1340, 1362 (Fed. Cir. 2009) (“An obviousness determination requires that a skilled artisan would have perceived a reasonable expectation of success in making the invention in light of the prior art.”); *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 538, 416 (2007) (The primary basis for a rationale to support a conclusion that a claim would have been obvious is that all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded nothing more than predictable results to one of ordinary skill in the art.). Considering the entire record, including the objective indicia of non-obviousness, we find that the person of ordinary skill in the art would have had reason to sterilize the things identified as “sterile” in the ChloroPrep PAR and would have had a reasonable expectation of success in doing so.

*b) Dependent Claims 7, 8, 17, and 18*

Claims 7, 8, 17, and 18 include limitations requiring a sterilized additive, specifically a sterilized colorant. Ex. 1001, 27:40–48, 28:35–43.

Petitioner contends that ChloroPrep PAR in combination with Degala renders this claim limitation obvious because the improved sterilization methods disclosed in Degala are generally applicable to “antiseptic solution[s] contained in a container” and that the “[p]referred antiseptic agents include octenidine, such as octenidine dihydrochloride, and chlorhexidine, such as chlorhexidine gluconate.” Pet. 60 (citing Ex. 1007 ¶¶ 25, 30); Reply 21. Moreover, according to Petitioner, Degala teaches that its novel sterilization methods can be applied more generally to

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“medicaments, chemical compositions, cleansing agents, cosmetics, or the like.” Pet. 60 (citing Ex. 1007 ¶ 27). Therefore, Petitioner argues that a skilled artisan would have been motivated to apply the sterilization methods described in Degala to the particular antiseptic solution described in the ChloroPrep PAR, which contains, *inter alia*, a colorant. *Id.* Petitioner further argues that “a skilled artisan would be particularly motivated to do so in light of the description in the ChloroPrep PAR that the antiseptic solution is ‘sterile.’” *Id.* at 60–61 (citing Ex. 1005, 7). Petitioner asserts that a skilled artisan also would have understood that “the sterilization process applied to the ampoule containing the chlorhexidine gluconate composition must also be applied to additives included therein.” *Id.* at 61. Thus, Petitioner concludes that “applying the sterilization methods of Degala to the antiseptic solution of the ChloroPrep PAR would result in a ‘sterilized colorant.’” *Id.* (citing Ex. 1003 ¶¶ 159–62).

Patent Owner disagrees with Petitioner and notes that Degala teaches its “sterilization methods can be applied more generally to ‘medicaments, chemical compositions, cleansing agents, cosmetics, or the like.’” PO Resp. 52 (citing Pet. 60). But, Patent Owner argues, “none of these is alleged to be one of the seven claimed additives and, in any case, Degala does not teach subjecting any to its sterilization method.” *Id.* (citing Ex. 1007 ¶ 27 (“[w]hile antiseptic solutions are of particular focus herein, the container may alternatively contain medicaments, . . .”); Ex. 2023 ¶¶ 396–397).

Patent Owner further argues “Petitioner has not established the PAR discloses a CHG composition containing a colorant.” *Id.* (citing Ex. 2023 ¶¶ 272, 395). Patent Owner then asserts that “Petitioner cites no evidence

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that it was known to sterilize any additive (much less a colorant in a CHG composition) or that it could be done with a reasonable expectation of success.” *Id.* (citing Ex. 2023 ¶¶ 397–398, 400). Indeed, according to Patent Owner, “Chiang stated that the dye in ChloraPrep was separate from the CHG composition and described how the combination of dyes with CHG presented further stability challenges.” *Id.* (citing Ex. 2015 ¶ 13, Ex. 2023 ¶ 398).

We do not agree with Patent Owner and find that the preponderance of the evidence in the record supports Petitioner’s position. Specifically, as discussed previously *supra* § III.A.7, we find that the ChloraPrep PAR has a colorant because it states explicitly that the ChloraPrep includes a tint. *See* Ex. 1006, 1 (the coversheet states “ChloraPrep *with Tint* 2% w/v/70%v/v Cutaneous Solution”), 7 (when describing the nature and contents of the container, it states “ChloraPrep *with Tint* is a sterile alcoholic antiseptic solution.”).

The ChloraPrep PAR also lists the colorant Sunset Yellow (E110) as an excipient. *Id.* at 7, 17. The ChloraPrep PAR explains that “Sunset yellow (E110) is commonly used as an excipient or additive in medicinal and food products.” *Id.* at 19. Dr. Rutala testified that an excipient in a CHG composition is “an inactive ingredient in the composition” and is “essentially the medium in some way for the active substance.” Ex. 1040, 234:15–239:7. He further testified that if a “composition is sterile . . . the excipients have to be sterile.” *Id.* This testimony is supported by Dr. Dabbah, who testifies regarding Sunset Yellow that “[a]s an excipient included within the sterilized chlorhexidine gluconate solution, that colorant is similarly sterile and sterilized” and “approval of ChloraPrep’s description

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as a sterile composition in the ChloroPrep PAR, requires the sterilization of all substances in the solution.” Ex. 1003 ¶ 127.

Therefore, as discussed previously *supra* § III.A.7, we find that Sunset Yellow is a colorant and a commonly used excipient for medicinal products, and as such is part of the sterilized composition. Accordingly, we conclude Petitioner has demonstrated by a preponderance of the evidence that challenged dependent claims 7, 8, 17, and 18 would have been obvious to a person of ordinary skill in the art under 35 U.S.C. § 103 in view of ChloroPrep PAR and Degala.

*c) Dependent Claims 10 and 19*

Petitioner contends Degala renders dependent claims 10 and 19 obvious because it provides detailed disclosure of achieving a SAL of  $10^{-3}$  to  $10^{-9}$ :

In another aspect of the present invention, it was found that the inventive method has a sterility assurance level (SAL) of at least about  $10^{-6}$  under particular combination of sterilization temperature and sterilization time.... For example, it has been found that a method of exposing the antiseptic solution to a temperature of  $100^{\circ}\text{C}$ . for about 50 minutes, a temperature of  $105^{\circ}\text{C}$ . for about 17 minutes, or  $110^{\circ}\text{C}$ . for about 6 minutes would each have a SAL of at least  $10^{-6}$  (i.e., a 1/1,000,000 chance that a viable microbe will be present in a sterilized solution).

Pet. 59 (citing Ex. 1007 ¶ 41); *see* Reply 21 (citing Ex. 1017, 8).

Additionally, Petitioner notes Degala’s statement that, “further testing was conducted to determine at what time the Sterility Assurance Level (SAL) of  $10^{-6}$  can be reached at a certain temperature.” *Id.* (citing Ex. 1007 ¶ 52).

Patent Owner contends that ChloroPrep PAR and Degala do not render claims 10 and 19 obvious because the claims require the product or



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article to have a “sterility assurance level from  $10^{-3}$  to  $10^{-9}$ ” and this limitation is not satisfied by a sterilized solution. PO Resp. 53 (citing Ex. 2023 ¶¶ 381–382). Patent Owner cites to the ’067 Patent to support its position that “the SAL of a product/article is not the same as the SAL of a solution” because “[i]n some embodiments, the chlorhexidine article 14 has a SAL of from  $10^{-3}$  to  $10^{-9}$ . As described above, the components of the sterilized chlorhexidine article 14 may also have a SAL corresponding to the SAL of the sterilized chlorhexidine article 14 . . . .” *Id.* (citing Ex. 1001, 16:63–67; Ex. 2023 ¶ 382). Patent Owner further contends Petitioner failed to establish that the claimed SAL range would have been obvious to a person of ordinary skill in the art. *Id.* (citing Ex. 2023 ¶¶ 379–387).

We do not agree with Patent Owner. Rather, for the same reasons discussed previously *supra* §§ III.A.1.a and III.A.8., we find that the record supports that claims 10 and 19 would have been obvious to a person of ordinary skill in the art at the critical time.

*d) Dependent Claims 2, 3, 5, 6, 11, and 13–16*

Petitioner argues dependent claims 2, 3, 5, 6, 11, and 13–16 are each rendered obvious in view of ChloraPrep PAR in combination with Degala. Pet. 38–43, 48 (citing Ex. 1003 ¶¶ 114–126, 135–137); Reply 20 (citing Ex. 1006, 5).

Patent Owner argues the ChloraPrep PAR fails to disclose the limitations required by dependent claims 2, 3, 5, 6, 11, and 13–16. PO Resp. 54 (citing Ex. 2023 ¶ 402). Patent Owner specifically argues that these challenged dependent claims are not obvious at least because they are not anticipated by the ChloraPrep PAR and claims 1 and 12, from which

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these claims depend, are not obvious in view of the ChloraPrep PAR alone or in combination with Degala. *Id.*

We have considered carefully all arguments and supporting evidence in light of the limitations recited in challenged dependent claims 2, 3, 5, 6, 11, and 13–16. Based on the entirety of the proceeding record, we conclude Petitioner has demonstrated by a preponderance of the evidence that challenged dependent claims 2, 3, 5, 6, 11, and 13–16 would have been obvious to a person of ordinary skill in the art under 35 U.S.C. § 103 in view of ChloraPrep PAR and Degala.

#### IV. MOTIONS FOR A PROTECTIVE ORDER AND TO SEAL

Patent Owner moves for entry of a stipulated protective order and for an order sealing Exhibits 2026–2032 and 2045 as well portions of the Patent Owner Response and the Declaration of Dr. Rutala (Ex. 2023) that quote these exhibits. Paper 25; Paper 36. These motions are unopposed.

A party may move to seal confidential information including, *inter alia*, sensitive commercial information. Consolidated Patent Office Trial Practice Guide, 19 (Nov. 2019); 37 C.F.R. § 42.54. It is the movant’s burden to show good cause for sealing such information, and we balance the party’s asserted need for confidentiality with the strong public interest in open proceedings. *Argentum Pharms. LLC v. Alcon Research, Ltd.*, IPR2017-01053, Paper 27 at 4 (PTAB Jan. 19, 2018) (informative).

Patent Owner provides a sufficient explanation for sealing the identified exhibits and the portions of the Patent Owner Response and the Rutala Declaration that quote those exhibits. Exhibits 2026–2030 include Petitioner’s sales data and projections. Exhibit 2031 is a document relating to Petitioner’s business strategy for ChlorPrep. Exhibit 1032 comprises

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internal meeting minutes relating to a U.S. FDA public hearing. And portions of Exhibit 2045 specify confidential parameters of Petitioner’s manufacturing process.

Our Decision does not rely heavily on any of the material at issue and Patent Owner has established good cause for sealing 2026–2032 and 2045 as well the portions of the Patent Owner Response and the Declaration of Dr. Rutala that quote those exhibits. Accordingly, we grant Patent Owner’s request to seal Exhibits 2026–30 and the portions of the Patent Owner Response and the Declaration of Dr. Rutala that quote those exhibits. Additionally, we enter the default Protective Order in this case.

Patent Owner has not filed a public version of the Declaration of Dr. Rutala (Ex. 2023) in this case. Patent Owner is ordered to do so within five business days of the entry of this Decision.

## V. CONCLUSION

Based on the evidence presented with the Petition, the evidence introduced during the trial, and the parties’ respective arguments, Petitioner has shown by a preponderance of the evidence that the challenged claims 1–3, 5–8, and 10–19 would have been obvious in view of ChloroPrep PAR alone or in combination with Degala.<sup>16</sup>

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<sup>16</sup> Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding after the issuance of this Final Written Decision, we draw Patent Owner’s attention to the April 2019 Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of

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In summary:

<b>Claims</b>	<b>35 U.S.C. §</b>	<b>Reference(s)/ Basis</b>	<b>Claims Shown Unpatentable</b>	<b>Claims Not Shown Unpatentable</b>
1-3, 5-8, 10-19	102	ChloraPrep PAR	1-3, 5-8, 10- 19	
1-3, 5-8, 10-19	103(a)	ChloraPrep PAR	1-3, 5-8, 10- 19	
1-3, 5-8, 10-19	103(a)	ChloraPrep PAR, Degala	1-3, 5-8, 10- 19	
<b>Overall Outcome</b>			1-3, 5-8, 10- 19	

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any such related matters in updated mandatory notices. *See* 37 C.F.R. §§ 42.8(a)(3), (b)(2).

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## VI. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1–3, 5–8, 10–18, and 20 in the '067 patent is determined to be unpatentable; and

FURTHER ORDERED that Patent Owner's Motion for Entry of Stipulated Protective Order (Appendix A to Paper 19) and to Seal is *granted*;

FURTHER ORDERED that Petitioner's Motion to Seal (Paper 30) is *granted*;

FURTHER ORDER that Patent Owner shall file a redacted public version of Ex. 2023 within five business days of the entry of this order;

FURTHER ORDERED that, because this is a Final Written Decision, the parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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US010398642B1

(12) **United States Patent**  
**Allen et al.**

(10) **Patent No.:** **US 10,398,642 B1**

(45) **Date of Patent:** **\*Sep. 3, 2019**

(54) **STERILIZED CHLORHEXIDINE ARTICLE  
AND METHOD OF STERILIZING A  
CHLORHEXIDINE ARTICLE**

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(\*) Notice: Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 0 days.

This patent is subject to a terminal dis-  
claimer.

(21) Appl. No.: **16/231,034**

(22) Filed: **Dec. 21, 2018**

#### Related U.S. Application Data

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Nov. 23, 2016, now Pat. No. 10,188,598.

(60) Provisional application No. 62/259,727, filed on Nov.  
25, 2015.

(51) **Int. Cl.**  
**A61K 9/00** (2006.01)  
**A61K 31/155** (2006.01)

(52) **U.S. Cl.**  
CPC ..... **A61K 9/0014** (2013.01); **A61K 31/155**  
(2013.01)

(58) **Field of Classification Search**

CPC ..... A01N 47/44; A01N 31/02; A01N 25/02;  
A01N 43/40; A01N 2300/00; A01N  
25/00; A01N 61/00; A01N 25/34; A01N  
25/08; A01N 33/12; A01N 55/02; A01N  
25/04; A61K 31/155; A61K 31/14; A61K  
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A61K 45/06; A61K 47/183; A61K  
47/186; A61K 8/0208; A61K 9/0014;  
A61K 9/0019; A61K 31/00; A61K  
31/205; A61K 47/34; A61K 8/345; A61K  
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A61L 2/28; A61L 26/0014; A61L 2/04;  
A61L 26/0052; A61L 27/34; A61L 27/54;  
A61L 2/087; A61L 2202/21; A61L  
2300/402; A61L 2300/414; A61L 2/081;  
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A61L 15/46; A61L 2202/181; A61L  
2300/204; A61L 2300/236; A61L  
2300/252; A61L 2300/254; A61L  
2300/606; A61L 2300/61; A61L

2300/802; A61L 24/0015; A61L 24/0021;  
A61L 24/0031; A61L 27/3604; A61L  
27/3683; A61L 27/50; A61L 27/56; A61L  
2/0035; A61L 2/082; A61L 2/18; A61L  
15/28; A61L 15/42; A61L 15/425; A61L  
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2202/24; A61L 2202/26; A61L 2300/222;  
A61L 2300/406; A61L 2300/602; A61L  
2300/62; A61L 2/0005; A61L 2/0011;  
A61L 2/007; A61L 2/0088; A61L 2/08;  
A61L 2/232; A61L 2/24; A61L 2/26

See application file for complete search history.

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Primary Examiner — Audrea B Coniglio

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#### (57) ABSTRACT

The present disclosure provides a sterilized chlorhexidine product for topical disinfection. The product includes a sterilized chlorhexidine gluconate composition, an applicator for facilitating application of the sterilized chlorhexidine composition, and a receptacle containing the sterilized chlorhexidine gluconate composition to provide the sterilized chlorhexidine gluconate composition to impregnate the applicator when the receptacle is compromised. The sterilized chlorhexidine gluconate composition includes chlorhexidine gluconate and alcohol.

20 Claims, 5 Drawing Sheets

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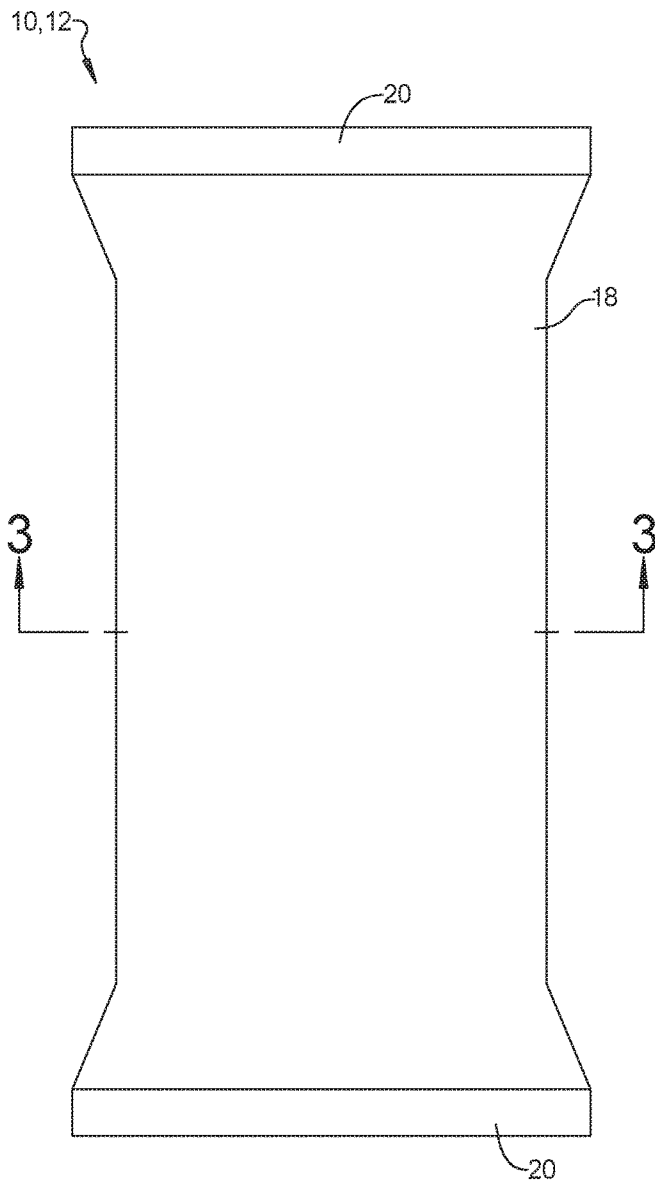


**U.S. Patent**

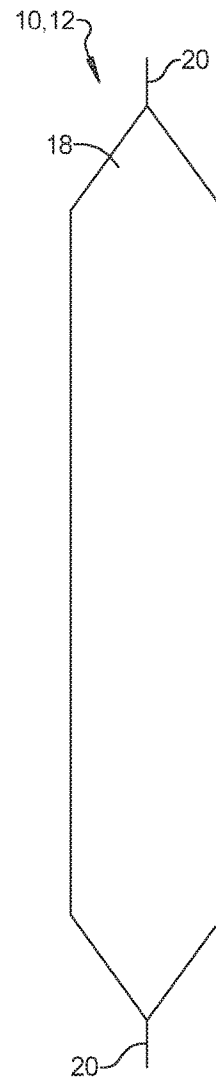
**Sep. 3, 2019**

**Sheet 1 of 5**

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**FIG. 1**



**FIG. 2**

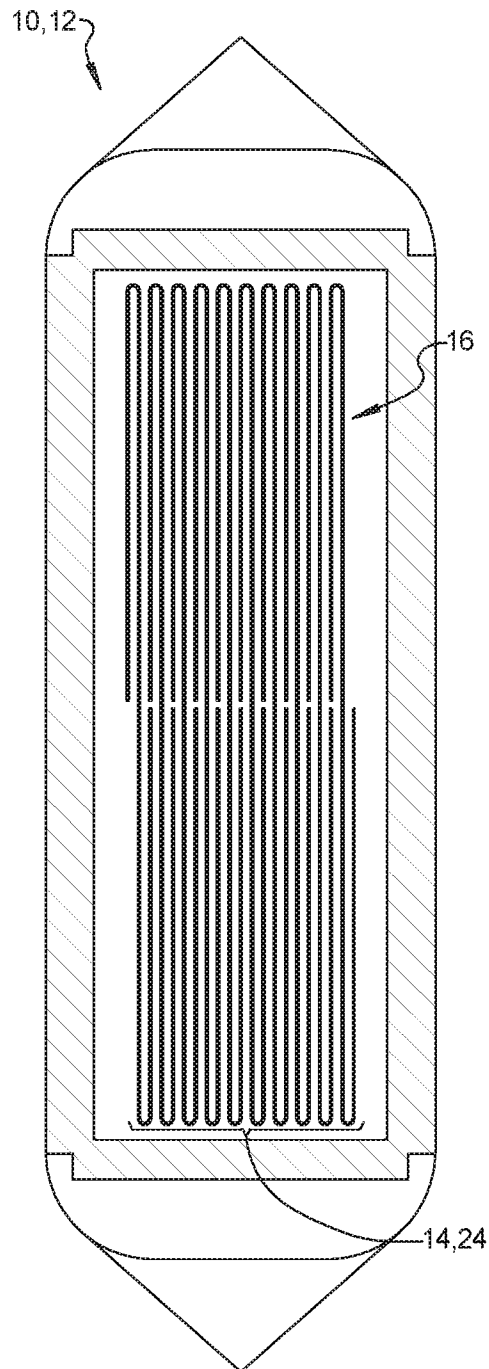


FIG. 3

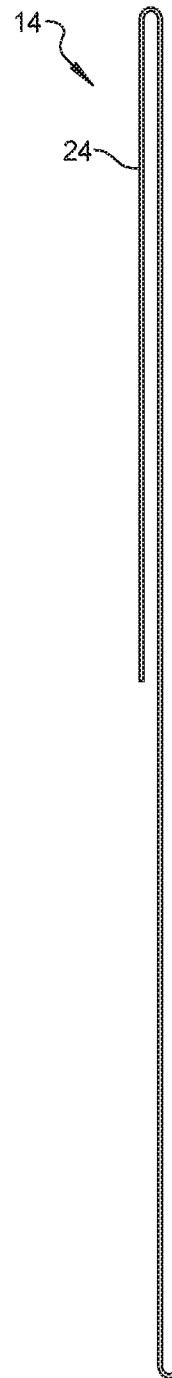
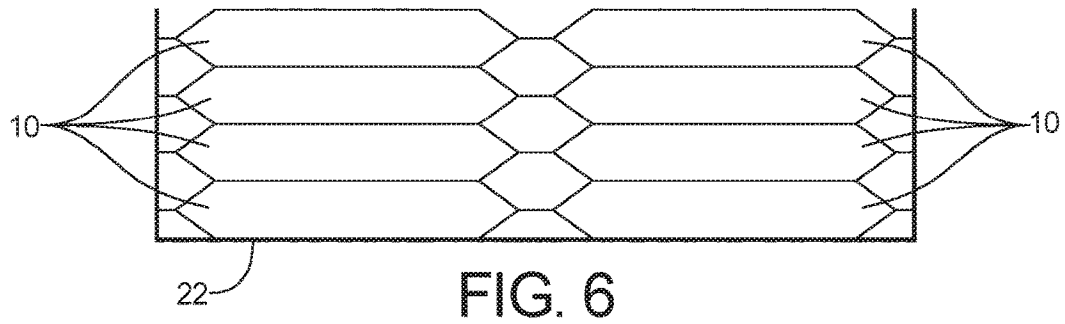
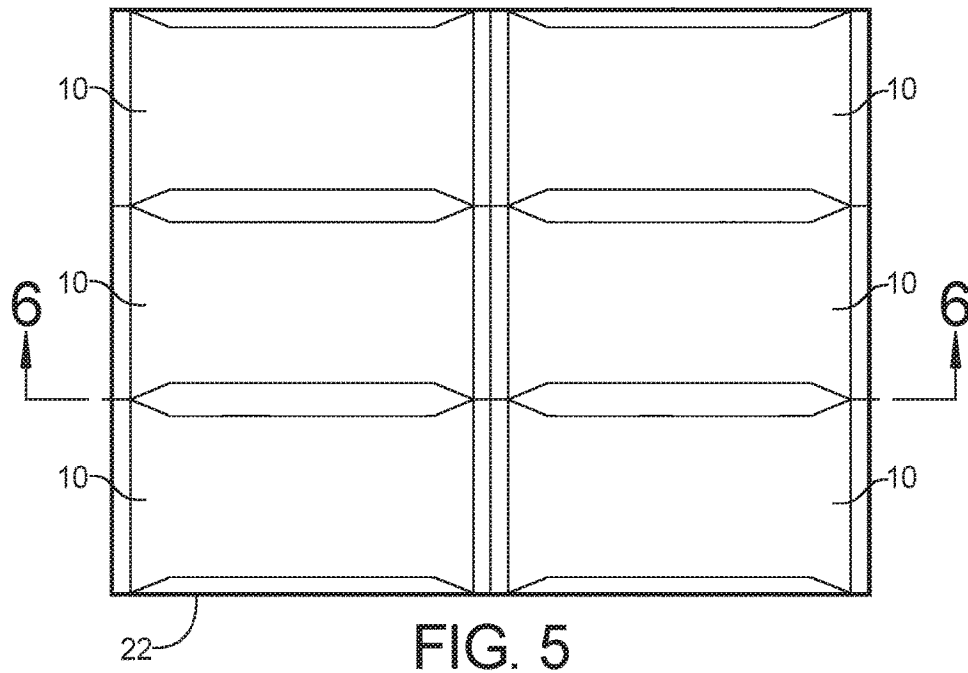
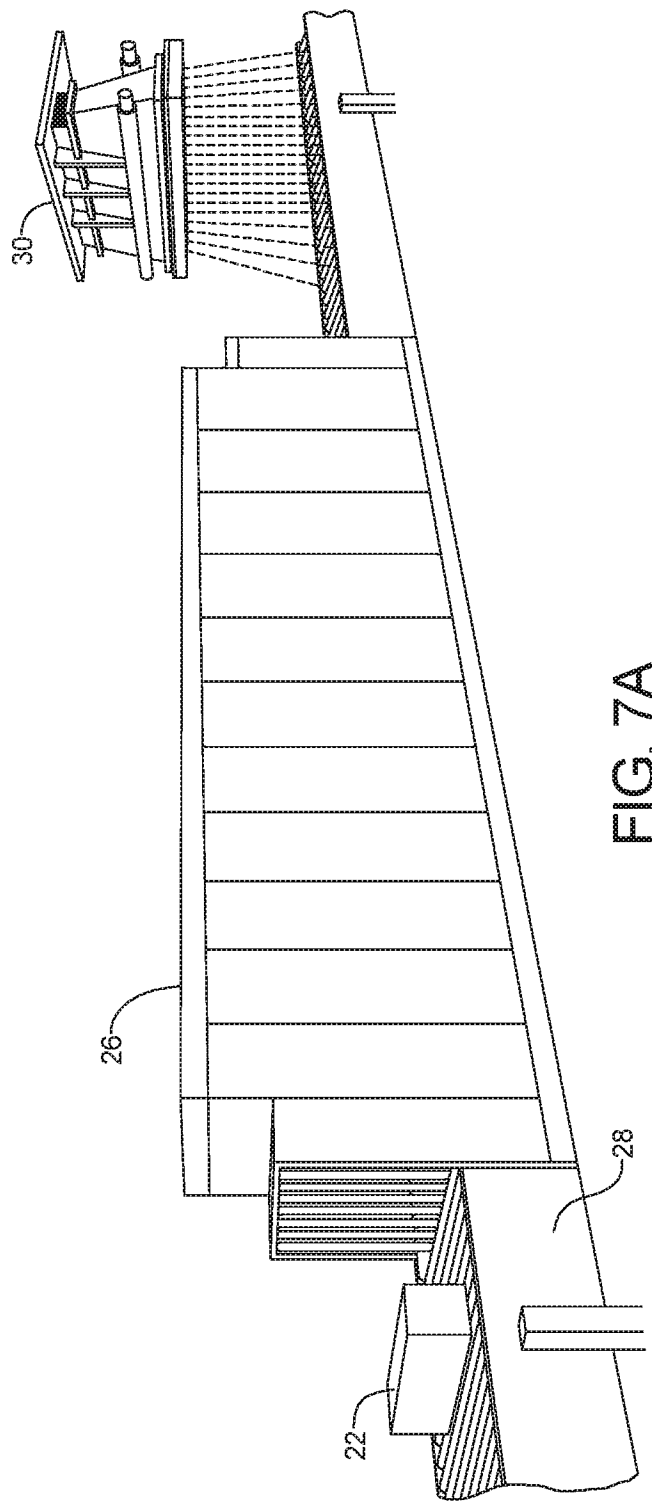


FIG. 4





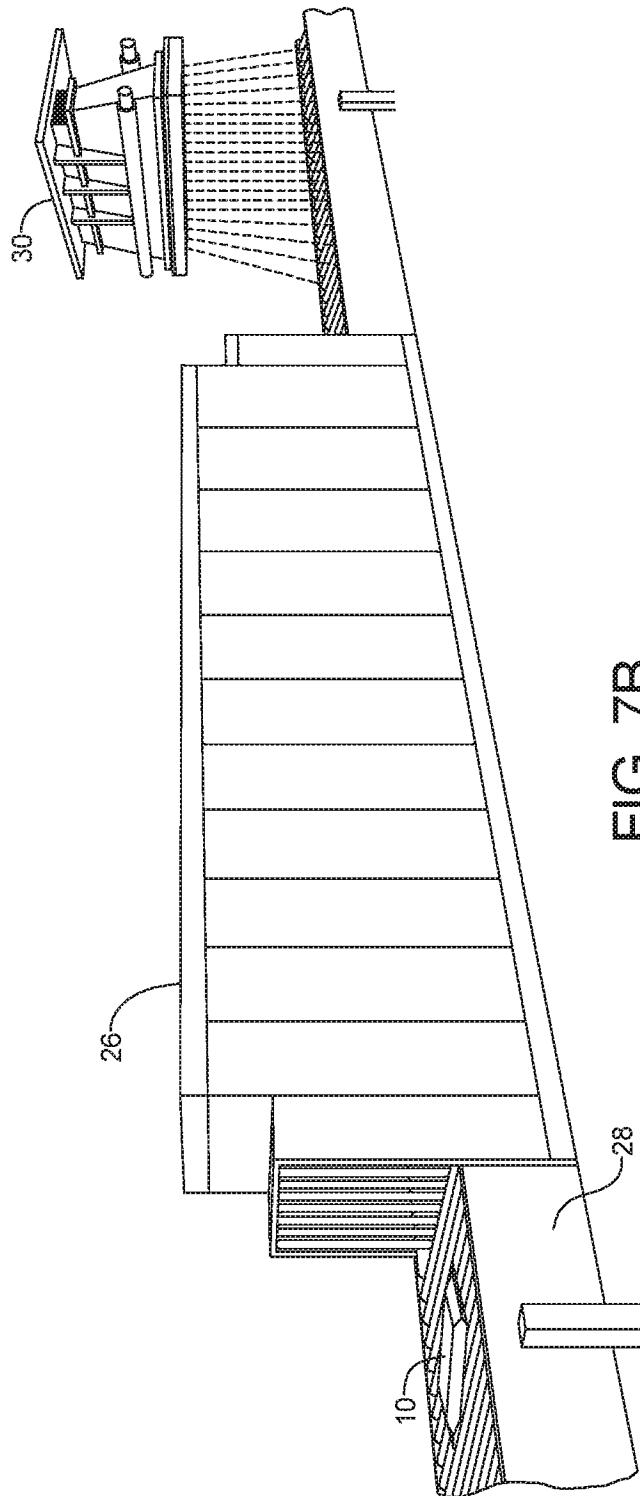


FIG. 7B

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# STERILIZED CHLORHEXIDINE ARTICLE AND METHOD OF STERILIZING A CHLORHEXIDINE ARTICLE

## CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 15/360,037, filed on Nov. 23, 2016, which claims priority to and the benefit of U.S. Patent Application No. 62/259,727, filed on Nov. 25, 2015. The entire contents of each are hereby incorporated by reference.

## BACKGROUND

The embodiments described herein relate to a sterilized chlorhexidine article and a method of sterilizing a chlorhexidine article.

Healthcare-associated infections (HAI's), which are infections contracted during the course of treatment for a medical or surgical condition, are a significant problem worldwide. HAI's are often caused by pathogenic microorganisms colonizing the patient's skin, mucous membranes, or hollow viscera. Surgery, trauma, and indwelling devices cause a breach in the body's natural barriers thereby providing a pathway for such pathogens to colonize and infect normally sterile areas of the body.

Measures to reduce colonization with pathogens have proven effective in reducing HAI's. One measure to reduce pathogens on the skin and mucous membranes is the topical application of antiseptics such as chlorhexidine. A convenient and effective means of applying chlorhexidine to the skin or mucous membranes is with the use of an applicator. For example, among their many uses, applicators may be used to apply chlorhexidine to decolonize the skin or mucous membranes of a patient or a healthcare worker prior to a surgical procedure to help prevent a surgical site infection, or they may be used on hospitalized patients with indwelling devices such as central venous catheters, urinary catheters, or endotracheal tubes to routinely decolonize the patient's skin or mucous membranes to help prevent self-infection.

It has been a challenge to develop a chlorhexidine article, and a method of sterilizing a chlorhexidine article.

## SUMMARY

In one embodiment, a sterilized chlorhexidine product is provided. The sterilized chlorhexidine product comprises a package defining an interior volume. The sterilized chlorhexidine product further comprises a sterilized chlorhexidine article. The sterilized chlorhexidine article comprises a sterilized applicator and a sterilized antiseptic composition impregnated in the sterilized applicator. The sterilized antiseptic composition comprises a sterilized solvent. The sterilized antiseptic composition further comprises a sterilized antibacterial agent dissolved in the sterilized solvent. The sterilized applicator and the sterilized antiseptic composition are disposed in the interior volume of the package. The sterilized chlorhexidine article has a Sterility Assurance Level of from  $10^{-3}$  to  $10^{-9}$ .

The present disclosure also provides a method of sterilizing a chlorhexidine article. The method comprises providing an applicator. The method further comprises providing an antiseptic composition comprising a solvent and an antibacterial agent dissolved in the solvent. The method further comprises sealing the chlorhexidine article inside the

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package to form a chlorhexidine product. The method further comprises cooling the chlorhexidine product. The method further comprises sterilizing the chlorhexidine product to form a sterilized chlorhexidine article.

## BRIEF DESCRIPTION OF THE FIGURES

Advantages of the present invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a top view of a sterilized chlorhexidine product in accordance with one embodiment.

FIG. 2 is a side view of the sterilized chlorhexidine product of FIG. 1.

FIG. 3 is a cross-sectional view of the sterilized chlorhexidine product of FIG. 1 including a plurality of sterilized chlorhexidine articles.

FIG. 4 is an expanded view of one of the plurality of sterilized chlorhexidine articles of FIG. 3.

FIG. 5 is a top view of a shipping container containing a plurality of the sterilized chlorhexidine products of FIG. 1.

FIG. 6 is a cross-sectional view of the shipping container of FIG. 6.

FIG. 7A is a perspective view of a conveyor mechanism including a shipping container, a cooling unit, and a radiation unit.

FIG. 7B is a perspective view of the conveyor mechanism of FIG. 7A with a chlorhexidine product in place of the shipping container.

## DETAILED DESCRIPTION

In one embodiment, as shown in FIGS. 1, 2, 3, and 4, a sterilized chlorhexidine product 10 comprises a package 12 and a chlorhexidine article 14. The package 12 defines an interior volume 16. The chlorhexidine article 14 is removably disposed in the interior volume 16 of the package 12.

In some embodiments, the package 12 comprises a film 18 having sealed end portions 20 as shown in FIG. 1. The package 12 may have a rectangular geometry. Of course, it is contemplated the package 12 may have any geometrical configuration suitable for receiving the chlorhexidine article 14 such as, by way of non-limiting example, a rectangular geometry.

Referring to FIGS. 1 and 3, in the illustrated embodiment, the film 18 and the sealed end portions 20 form a hermetic seal about the interior volume 16 and the chlorhexidine articles 14 disposed therein. In this manner, the package 12 protects the chlorhexidine articles 14 from contamination because the chlorhexidine articles 14 are not exposed to the environment outside the package 12. Thus, the package 12 is particularly suitable for terminal sterilization processes such as those described in detail below. While a specific configuration of the package is described, it is contemplated that the package may be adapted based on the configuration of the chlorhexidine articles 14 disposed therein.

In some embodiments, the package may further comprise a tear seal that facilitates access to the chlorhexidine articles disposed in the package. The tear seal may be arranged on the package such that the tear seal does not compromise the hermetic seal formed by the film and the sealed end portions. In this manner, the package may hermetically seal the chlorhexidine articles disposed therein and also allow a patient care provider to easily access the chlorhexidine articles.

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In other embodiments, the film may define an outlet for dispensing the chlorhexidine articles disposed within the package. The package may further comprise a label for the outlet. The label may be applied to an external surface of the package over the outlet. The label may have a free or non-adhered end for peeling the label to expose the outlet. Of course, it will be appreciated that when the package comprises an outlet and a label, the package may not hermetically seal the chlorhexidine articles and thus may not be suitable for terminal sterilization processes.

In certain embodiments, one or more chlorhexidine articles **14** may be disposed in the interior volume **16** of the package **12**. The number of chlorhexidine articles **14** disposed into each package **12** is not particularly limited, and may correspond to the desired dosage of antiseptic intended to be delivered to the patient. In other embodiments, a single chlorhexidine article **14** is disposed in the interior volume **16** of the package **12**. More particularly, in some embodiments, the number of chlorhexidine articles **14** disposed in the package **12** may be the same as the number of chlorhexidine articles **14** that are used for a particular task. As an example, when the particular task requires six chlorhexidine articles **14**, six chlorhexidine articles **14** may be disposed in each package. In this manner, a patient care provider will be discouraged from using either too many, or too few, chlorhexidine articles **14** for the particular task. In other embodiments, the one or more of chlorhexidine articles **14** disposed in the package may be of from 2 to 10, of from 2 to 8, of from 2 to 6, or of from 2 to 4. In one embodiment, two chlorhexidine articles **14** are disposed in each package **12**. With reference to FIG. 2, in the illustrated embodiment, ten chlorhexidine articles **14** are disposed in the package **12**. Of course, still other quantities of chlorhexidine articles **14** may be disposed in each package **12**. It should be appreciated that in other instances, the chlorhexidine articles **14** are not disposed within the interior volume **16** of the package **12**, but may be prevented from exposure to the external environment through other means.

With reference to FIGS. 5 and 6, in some embodiments, a one or more of chlorhexidine products **10** may be disposed in a shipping container **22**, such as a cardboard box **22**. The number of chlorhexidine products **10** disposed in the shipping container **22** is advantageously selected based on the type of sterilizing process to be applied. For example, the shipping container may comprise of from 5 to 50 chlorhexidine products **10**. In other embodiments, the shipping container **22** may comprise fewer than twenty sterilized chlorhexidine products **10** to permit sterilization of all chlorhexidine articles **14** disposed therein. In still other embodiments, the shipping container may comprise of from 40 to 150 sterilized chlorhexidine products **10**. Of course, still other quantities of sterilized chlorhexidine products **10** may be disposed in the shipping container **22**.

It should be appreciated that the present disclosure describes a method of sterilizing a chlorhexidine product to form a sterilized chlorhexidine article. As such, throughout this disclosure, description that accompanies the terms the chlorhexidine article, or components and compositions thereof, may be referred to as the 'sterilized' component or composition upon being exposed to suitable processing where such sterility can be validated. By way of non-limiting example, the sterility of the chlorhexidine article may be validated in accordance with ISO 11137.

In certain embodiments, the sterilized chlorhexidine article is intended to be used by a patient care provider for disinfecting skin or mucous membranes of a patient, such as disinfecting skin or mucous membranes of the patient prior

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to surgery or to routinely disinfect the skin during hospitalization. Alternatively, the sterilized chlorhexidine article may be used to maintain hygiene of a patient, particularly a patient unable to shower or bathe.

With reference to FIG. 4, the chlorhexidine article **14** comprises an applicator **24** and an antiseptic composition. The applicator **24** facilitates topical application of the antiseptic composition to the skin or mucous membranes of a patient. As such, the applicator **24** may take any form suitable for topically applying the antiseptic composition to the skin or mucous membranes of a patient. Characteristics that may be considered when determining whether an applicator **24** is suitable include, by way of non-limiting example, porosity, absorbency, skin or mucous membrane contactable surface area, biocompatibility, ability of the applicator to retain the antiseptic composition, cost of production, etc. By way of non-limiting example, suitable examples of the applicator **24** include a cloth, a foam, a brush, a squirt bottle, a roller, etc.

In certain embodiments, the applicator **24** may be suitable for impregnation with the antiseptic composition such that the antiseptic composition remains dispersed in the applicator until the chlorhexidine article **14** is applied to the skin or mucous membranes of a patient. In this manner, the antiseptic composition of the chlorhexidine article **14** remains impregnated in and retained by the applicator **24** when the chlorhexidine article **14** is disposed within the package **12**. When the applicator **24** is applied to the skin or mucous membranes of the patient, the antiseptic composition is transferred from the applicator **24** to the skin or mucous membranes of the patient.

In some embodiments, the applicator may further comprise a receptacle for receiving the antiseptic composition. When the applicator comprises a receptacle, the antiseptic composition may be received in the receptacle. The antiseptic composition received in the receptacle may be subsequently impregnated in the applicator by a patient care provider when the chlorhexidine article is being used to disinfect the skin or mucous membranes of a patient. In this manner, the antiseptic composition does not need to be impregnated in and retained by the applicator prior to disposing the chlorhexidine article in the package. In such embodiments, a barrier may be positioned between the applicator and the receptacle that may be compromised upon activation by the patient care provider.

With reference to FIG. 4, in one embodiment, the applicator **24** may comprise a cloth **24**. The cloth **24** may be woven, knitted, non-woven, velour, felt, flocked, needle-punched, tufted, stitch bonded, fusion-bonded, or combinations thereof. Of course, still other types of cloth are contemplated. The cloth **24** may have any weight suitable for applying the antiseptic composition to the skin or mucous membranes of the patient such as, by way of non-limiting example, of from 3.0 to 7.0, of from 4.0 to 6.0, or of from 4.5 to 5.5, ounce per square yard. The cloth **24** may have a tensile strength suitable for applying the antiseptic composition such as, by way of non-limiting example, at least 15, at least 20, or at least 25, pounds per inch in a given direction, with the given direction correlating to a machining direction of the cloth **24**. The cloth **24** may have any thickness suitable for applying the antiseptic composition to the skin or mucous membranes of a patient such as, by way of non-limiting example, of from 0.035 to 0.145, of from 0.45 to 0.135, of from 0.055 to 0.125, of from 0.075 to 0.115, or of from 0.085 to 0.105 inches.

In some embodiments, the cloth **24** is disposable. When the cloth **24** is disposable, the cloth **24** may be disposed of

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after use so as to minimize the chance of contaminating the skin or mucous membranes of a patient during re-use. Of course, in other embodiments, the cloth **24** is re-usable.

The cloth **24** may comprise a first fiber. The first fiber may be a synthetic fiber or a natural fiber. When the first fiber is a synthetic fiber, the first fiber may be selected from the group comprising polyester fiber, polypropylene fiber, polyethylene fiber, rayon fiber, nylon fiber, acrylic fiber, acetate fiber, spandex fiber, latex fiber, Kevlar fiber, or combinations thereof. Of course still other types of synthetic fiber are contemplated such as, by way of non-limiting example, polyamide fiber, azlon fiber, modacrylic fiber, novoloid fiber, nylril fiber, saran fiber, vinal fiber, vinyon fiber, regenerated cellulose fiber, and cellulose acetate fiber. In instances where the first fiber comprises a natural fiber, the first fiber may be selected from the group comprising cotton fiber, wool fiber, silk fiber, jute fiber, and linen fiber. Of course, still other types of natural fiber are contemplated.

In some embodiments, the cloth **24** may comprise a second fiber in addition to the first fiber. The second fiber may comprise any of the materials contemplated for the first fiber. When present, the second fiber may be different from the first fiber or the same as the first fiber. For example, the first fiber may be polyester fiber and the second fiber may be polyester fiber. Alternatively, the first fiber may be polyester fiber and the second fiber may be polypropylene fiber. Of course, still other combinations of the first fiber and second fiber are contemplated. Moreover, it is contemplated that the cloth may comprise three or more fibers comprising any of the materials contemplated for the first fiber.

When present, the second fiber may be different from the first fiber or the same as the first fiber. For example, the first fiber may be polyester fiber and the second fiber may be polyester fiber. Alternatively, the first fiber may be polyester fiber and the second fiber may be polypropylene fiber. Of course, still other combinations of the first fiber and second fiber are contemplated.

In one embodiment, the first fiber has a length of from 1.0 to 3.0 inches. In another embodiment, the first fiber has a length of from 1.0 to 2.0 inches. In other embodiments, the first fiber has a length of from 0.5 to 6.0, of from 0.5 to 5.0, of from 0.5 to 4.0 or from 0.5 to 3.0, inches. In still other embodiments, the first fiber has a length of from 2.0 to 6.0, of from 3.0 to 6.0, of from 4.0 to 6.0, or of from 5.0 to 6.0, inches. In still other embodiments, the first fiber has a length of from 0.5 to 2.5, of from 0.75 to 2.25, of from 1.0 to 2.0, or of from 1.25 to 1.75, inches. Of course, still other lengths of the first fiber are contemplated.

In one embodiment, the second fiber has a length of from 2.0 to 4.0 inches. In another embodiment, the second fiber has a length of from 2.5 to 3.5 inches. In other embodiments, the second fiber has a length of from 1.0 to 5.0, of from 2.0 to 5.0, of from 3.0 to 5.0, or of from 4.0 to 5.0, inches. In still other embodiments, the second fiber has a length of from 1.0 to 4.0, 1.0 to 3.0, or of from 1.0 to 2.0 inches. In still other embodiments, the second fiber has a length of from 2.25 to 3.75, of from 2.5 to 3.5, or of from 2.75 to 3.25 inches. Of course still other lengths of the second fiber are contemplated. It will be readily appreciated that the second fiber may have the same length as the first fiber, or within any of the ranges described herein for the first fiber. Moreover, the first fiber may have a length within any of the ranges described herein for the second fiber.

In one embodiment, the first fiber may have a denier of from 0.5 to 2.5. In another embodiment, the first fiber may have a denier 1.0 to 2.0. In other embodiments, the first fiber may have a denier of from 0.75 to 2.5, of from 1 to 2.5, of

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from 1.25 to 2.5, of from 1.5 to 2.5, of from 1.75 to 2.5, of from 2.0 to 2.5, or of from 2.25 to 2.5. In still other embodiments, the first fiber may have a denier of from 0.5 to 2.25, of from 0.5 to 2.0, of from 0.5 to 1.75, of from 0.5 to 1.5, of from 0.5 to 1.25, of from 0.5 to 1.0, or of from 0.5 to 0.75. In still other embodiments, the first fiber has a denier of from 0.8 to 1.5, or of from 1.0 to 1.3. Of course, still other deniers of the first fiber are contemplated.

In one embodiment, the second fiber may have a denier of from 4.5 to 5.0. In another embodiment, the second fiber may have a denier of from 4.0 to 6.0. In other embodiments, the second fiber may have a denier of from 4.25 to 6.0, of from 4.5 to 6.0, of from 4.75 to 6.0, of from 5.0 to 6.0, of from 5.25 to 6.0, of from 5.5 to 6.0, or of from 5.75 to 6.0. In still other embodiments, the second fiber may have a denier of from 4.0 to 5.75, of from 4.0 to 5.5, of from 4.0 to 5.25, of from 4.0 to 5.0, of from 4.0 to 4.75, of from 4.0 to 4.5, or of from 4.0 to 4.25. In still other embodiments, the second fiber may have a denier of from 4.0 to 5.0, or of from 4.25 to 5.0. Of course, still other deniers of the second fiber are contemplated. It will be readily appreciated that the second fiber may have the same denier as the first fiber, or within any of the ranges described herein for the first fiber. Moreover, the first fiber may have a denier within any of the ranges described herein for the second fiber.

In some embodiments, when the cloth comprises the first fiber and the second fiber, the first fiber may be included in an amount of from 40 to 99, of from 50 to 90, of from 60 to 80, or of from 65 to 75, wt. % based on the total weight of the cloth, and the second fiber may be included in an amount of from 1 to 60, of from 10 to 50, of from 20 to 40, or of from 25 to 35, wt. % based on the total weight of the cloth. In other embodiments, the first fiber and the second fiber may be included in the same amount. In still other embodiments, the first fiber and the second fiber are not included in the same amount.

In one specific embodiment, the cloth **24** comprises the first fiber and the second fiber, with the first fiber comprising polyester fiber and the second fiber comprising polyester fiber. The first fiber has a length of from 1.0 to 3.0 inches and a denier of from 1.2 to 2.0. The second fiber has a length of from 3.0 to 4.0 inches and a denier of from 4.0 to 5.0. The first fiber is included in an amount of from 60 to 80 wt. % based on the total weight of the cloth **24**. The second fiber is included in an amount of from 20 to 40 wt. % based on the total weight of the cloth **24**. The cloth **24** has a thickness of from 0.055 to 0.125. The cloth **24** has a weight of from 3.8 to 5.8 ounces per square yard. The cloth **24** has a tensile strength of at least 27 pounds per square inch in a given direction, with the given direction correlating with a machining direction of the cloth **24**.

When the applicator **24** comprises the non-woven cloth **24**, the non-woven cloth **24** may be produced using any suitable method of producing a non-woven cloth as described herein. When the non-woven cloth **24** comprises a first fiber and a second fiber, the method of making the non-woven cloth may comprise blending the first and second fiber together to form blended fibers. The method may further comprise carding the blended fibers to form carded fibers, followed by crosslapping and then needle punching of the carded fibers to form a sheet of non-woven cloth. Thus, the first fiber and the second fiber are mechanically intertwined by needle punching. The sheet of non-woven cloth may then be cut into individual non-woven cloths. The non-woven cloth may, by way of non-limiting example, have a length of from 5 to 15 inches and a width of from 5 to 15 inches. In some embodiments, the length of the



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non-woven cloth may be equal to the width of the non-woven cloth. In other embodiments, the length and the width may be different. Of course, still other methods of producing the non-woven cloth **24** are contemplated.

In some embodiments, the method of producing a non-woven cloth may further comprise folding the sheet of non-woven cloth. By way of non-limiting example, the non-woven cloth may be folded in a “z-fold” (also known as an “s-fold”), a “c-fold,” or any other fold style suitable for the non-woven cloth. With reference to FIGS. 3 and 4, in the illustrated embodiment, the non-woven cloth **24** is folded in a “z-fold.” Of course, it is contemplated that in some embodiments the non-woven cloth may not be folded.

As described above, the applicator may comprise foam. The foam may comprise an open-celled foam or a closed-cell foam. The foam may comprise synthetic polymers. In some embodiments, when the foam comprises synthetic polymers, the synthetic polymers may be selected from the group comprising polyurethanes, polyesters, polyalkylenes, polyols, or combinations thereof. Of course, still other synthetic polymers are contemplated. Additionally, the foam may comprise natural polymers in other embodiments.

The antiseptic composition comprises one or more antibacterial agents and one or more solvents. As such, when applied to the skin or mucous membranes of a patient, the antiseptic composition is capable of killing or inhibiting the growth of bacteria on the skin or mucous membranes of the patient. In this manner, the antiseptic composition is suitable for disinfecting the skin or mucous membranes of a patient, particularly prior to a surgical operation.

The antibacterial agent may comprise chlorhexidine. The chlorhexidine may be free base chlorhexidine or a pharmaceutically acceptable salt of chlorhexidine. When the chlorhexidine is a pharmaceutically acceptable salt of chlorhexidine, the chlorhexidine may be, chlorhexidine dihydrochloride, chlorhexidine diacetate, chlorhexidine digluconate (also known as chlorhexidine gluconate, or CHG), chlorhexidine dilactate, chlorhexidine digalactate, or combinations thereof. In certain embodiments, the antibacterial agent is CHG. The pharmaceutically acceptable salt of chlorhexidine may be selected based on the solvent of the antiseptic composition due to the solubility properties of the pharmaceutically acceptable salt of chlorhexidine. For instance, CHG is soluble in water whereas chlorhexidine diacetate is substantially insoluble in water and is therefore more suitable for non-aqueous solvents.

It will be appreciated that the antibacterial agent may comprise compounds other than chlorhexidine such as, by way of non-limiting example, aminoglycoside compounds, polyhexanide, triclosan, quaternary ammonium compounds such as cetrimide, proflavine hemisulphate, chlorocresol, chlorophene, chloroxylenol, iodine, iodophors, etc., and combinations thereof. Of course, still other antibacterial agents are contemplated. Thus, while the term ‘chlorhexidine’ is used as an adjective throughout this disclosure to describe the product, article and other components thereof, it should be appreciated that products/articles may be free from chlorhexidine components if other antibacterial agents are utilized.

The antibacterial agent may be included in the antiseptic composition in an amount of from 0.1 to 10 wt. % based on the total weight of the antiseptic composition. In another embodiment, the antibacterial agent may be included in an amount of from 1.5 to 5.0 wt. % based on the total weight of the antiseptic composition. In other embodiments, the antibacterial agent may be included in an amount from 0.5 to 10, of from 1.0 to 10, of from 1.5 to 10, of from 2.0, to

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10, of from 2.5 to 10, of from 3.0 to 10, of from 3.5 to 10, of from 4.0 to 10, of from 4.5 to 10, of from 5.0 to 10, of from 5.5 to 10, of from 6.0 to 10, of from 6.5 to 10, of from 7.0 to 10, of from 7.5 to 10, of from 8.0 to 10, of from 8.5 to 10, of from 9.0 to 10, or of from 9.5 to 10 wt. % based on the total weight of the antiseptic composition. In still other embodiments, the antibacterial agent may be included in the antiseptic composition in an amount of from 0.1 to 9.5, of from 0.1 to 9.0, of from 0.1 to 8.5, of from 0.1 to 8.0, of from 0.1 to 7.5, of from 0.1 to 7.0, of from 0.1 to 6.5, of from 0.1 to 6.0, of from 0.1 to 5.5, of from 0.1 to 5.0, of from 0.1 to 4.5, of from 0.1 to 4.0, of from 0.1 to 3.5, of from 0.1 to 3.0, of from 0.1 to 2.5, of from 0.1 to 2.0, of from 0.1 to 1.5, of from 0.1 to 1.0, or of from 0.1 to 0.5, wt. % based on the total weight of the antiseptic composition. In still other embodiments, the antibacterial agent may be included in the antiseptic composition in an amount of from 0.5 to 8.0, of from 1.0 to 6.0, of from 1.5 to 5.0, of from 1.8 to 4.5, of from 1.8 to 3.5, or of from 1.8 to 2.5, wt. % based on the total weight of the antiseptic composition. The amount of antibacterial agent may vary outside of the ranges above, but is typically both whole and fractional values within these ranges. Further, it is to be appreciated that more than one antibacterial agent may be included in the antiseptic composition, in which case the total amount of all the antibacterial agents included is within the above ranges.

The solvent may comprise an aqueous solvent, a non-aqueous solvent, or combinations thereof. In certain embodiments, when the solvent comprises an aqueous solvent, the solvent may be water. The water may be distilled water, sterile water, purified water prepared in accordance with United States Pharmacopeia (USP) standards, or any other type of water that is suitable for use in antiseptic compositions.

In other embodiments, when the solvent is a non-aqueous solvent, the solvent may be an alcohol. Examples of alcohols suitable for the antiseptic composition include, by way of non-limiting example, ethanol or isopropyl alcohol. Of course, still other solvents are contemplated.

The solvent may be included in the antiseptic composition in an amount of at least 1 wt. % based on the total weight of the antiseptic composition. In another embodiment, the solvent may be included in the antiseptic composition an amount of at least 50 wt. % based on the total weight of the antiseptic composition. In other embodiments, the solvent may be included in the antiseptic composition in amount of at least 5, at least 10, at least 20, at least 30, at least 40, at least 50, at least 60, at least 70, at least 80, at least 90, at least 95, or at least 99, wt. % based on the total weight of the antiseptic composition. In still other embodiments, the solvent may be included in the antiseptic composition in an amount less than 99, less than 95, less than 90, less than 80, less than 70, less than 60, less than 50, less than 40, less than 30, less than 20, less than 10, or less than 5, wt. % based on the total weight of the antiseptic composition. In still other embodiments, the solvent is included in an amount of from 40 to 99, of from 50 to 95, of from 60 to 90, of from 65 to 85, or of from 75 to 85 wt. % based on the total weight of the antiseptic composition. The amount of solvent may vary outside of the ranges above, but is typically both whole and fractional values within these ranges. Further, it is to be appreciated that more than one solvent may be included in the antiseptic composition, in which case the total amount of all the solvents included is within the above ranges.

In certain embodiments, when the solvent is water, water may be included in the antiseptic composition in an amount of at least 50 wt. % based on the total weight of the antiseptic

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composition. In another embodiment, water may be included in the antiseptic composition in an amount of at least 60 wt. % based on the total weight of the antiseptic composition. In other embodiments, water may be included in the antiseptic composition in an amount of at least 65, at least 70, at least 75, or at least 80, wt. % based on the total weight of the antiseptic composition. In still other embodiments, water may be included in the antiseptic composition in an amount of from 50 to 99, of from 60 to 95, of from 70 to 90, of from 75 to 90, or of from 80 to 90, wt. % based on the total weight of the antiseptic composition. The amount of water may vary outside of the ranges above, but is typically both whole and fractional values within these ranges. Further, it is to be appreciated that more than one type of water may be included in the antiseptic composition, in which case the total amount of all the types of water included is within the above ranges.

In some embodiments, at least 95% of the antibacterial agent is dissolved in the solvent of the antiseptic composition. In other embodiments, at least 50, 60, 70, 80, 90, 99, wt. % of the antibacterial agent is dissolved in the solvent of the antiseptic composition. It is further contemplated that all of the antibacterial agent may be dissolved in the solvent of the antiseptic composition.

The antiseptic composition may further comprise a humectant. The humectant may be compatible for use in the antiseptic composition, particularly in view of the antibacterial agent included in the antiseptic composition. The humectant may be, by way of non-limiting example, glycerol prepared according to USP standards (USP glycerol), propylene glycol, polyethylene glycol, N-methyl pyrrolidone, N-ethyl pyrrolidone, diacetone alcohol,  $\gamma$ -butyrolactone, ethyl lactate, low molecular weight polyethylene glycol, and combinations thereof. In certain embodiments, the humectant comprises USP glycerol and propylene glycol. Of course, other types of humectants are contemplated such as, by way of non-limiting example, monosaccharides, disaccharides, castor oil and derivatives and salts thereof, vegetable oil extracts such as triglycerides, and combinations thereof. Of course, still other humectants are contemplated.

When present, the humectant may be included in the antiseptic composition in an amount less than 20 wt. % based on the total weight of the antiseptic composition. In another embodiment, the antiseptic composition is included in an amount of from 3.0 to 10 wt. % based on the total weight of the antiseptic composition. In other embodiments, the humectant is included in the antiseptic composition in an amount less than 17.5, less than 15, less than 12.5, less than 10, less than 7.5, less than 5.0, or less than 2.5, wt. % based on the total weight of the antiseptic composition. In still other embodiments, the humectant is included in an amount of at least 2.5, at least 5.0, at least 7.5, at least 10, at least 12.5, at least 15, at least 17.5, or at least 20, wt. % based on the total weight of the antiseptic composition. In still other embodiments, the humectant is included in the antiseptic composition in an amount of from 3.5 to 9.0, of from 4.0 to 8.0, of from 4.5 to 7.0, or of from 5.0 to 6.0, wt. % based on the total weight of the antiseptic composition. The amount of humectant may vary outside of the ranges above, but is typically both whole and fractional values within these ranges. Further, it is to be appreciated that more than one humectant may be included in the antiseptic composition, in which case the total amount of all the humectants included is within the above ranges. For example, the humectant may comprise USP glycerol in an amount of from 2.0 to 3.0 wt. % based on the total weight of the antiseptic composition

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and propylene glycol in an amount of from 2.5 to 3.5 wt. % based on the total weight of the antiseptic composition.

The antiseptic composition may further comprise an emollient. The emollient may be of any type that is suitable for topical application to a patient. The emollient may be, by way of non-limiting example, petroleum-based oils, petrolatum, vegetable oils, mineral oils, lanolin and derivatives thereof, glycerol esters and derivatives thereof, fatty esters, propylene glycol esters and derivatives thereof, alkoxylated carboxylic acids, aloe vera, fatty alcohols, dimethicone, alkyl methicones, alkyl dimethicones, phenyl silcones, alkyl trimethylsilanes, and combinations thereof. In certain embodiments, the emollient comprises dimethicone and aloe vera. Of course, still other emollients are contemplated.

When present, the emollient or other components of the antiseptic composition may comprise insoluble particles. In the context of this disclosure "insoluble particles" are particles that are not soluble in the solvent of the antiseptic composition. In certain embodiments, the insoluble particles have an average diameter of greater than 0.2 microns such that the antiseptic composition may not be sterilized by filtration because the insoluble particles are too large.

When present, the emollient may be included in the antiseptic composition in an amount less than 10 wt. % based on the total weight of the antiseptic composition. In another embodiment, the emollient may be included in the antiseptic composition in an amount less than 5 wt. % based on the total weight of the antiseptic composition. In other embodiments, the emollient is included in the antiseptic composition in an amount less than 2.5, less than 2.0, less than 1.5, less than 1.0, less than 0.5, less than 0.25, or less than 0.2, wt. % based on the total weight of the antiseptic composition. Alternatively, the antiseptic composition comprises an amount of emollient of from 0.01 to 1, 0.1 to 0.25, or 0.1 to 0.2, wt. % based on the total weight of the antiseptic composition. The amount of emollient may vary outside of the ranges above, but is typically both whole and fractional values within these ranges. Further, it is to be appreciated that more than one emollient may be included in the antiseptic composition, in which case the total amount of all the emollients included is within the above ranges.

The antiseptic composition may further comprise a surfactant. The surfactant may be any surfactant that is compatible with the antibacterial agent of the antiseptic composition. Depending on the antibacterial agent included in the antiseptic composition, the surfactant may be a cationic surfactant, an anionic surfactant, non-ionic surfactant, or combinations thereof. When the surfactant is a non-ionic surfactant, the non-ionic surfactant may be, by way of non-limiting example, polysorbate 20, polysorbate 40, polysorbate 60, polysorbate 80, polysorbate 120, a polyoxyethylene alkyl ether, polyoxyethylene cetyl ether, polyoxyethylene palmityl ether, polyoxyethylene oxide hexadecyl ether, polyethylene glycol cetyl ether, a sucrose ester, a partial ester of sorbitol, a monoglyceride, a diglyceride, di- and tri-esters of sucrose with fatty acid, nonylphenol ethoxylate (Igepal CO 630), nonoxynol-9 and combinations thereof. In certain embodiments, the surfactant comprises polysorbate 20 and Igepal CO 630. Of course, still other surfactants are contemplated.

When present, the surfactant may be included in the antiseptic composition in an amount less than 5.0 wt. % based on the total weight of the antiseptic composition. In another embodiment, the surfactant may be included in the antiseptic composition in an amount less than 2.5 wt. % based on the total weight of the antiseptic composition. In other embodiments, the surfactant may be included in the

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antiseptic composition in an amount less than 2.0, less than 1.5, less than 1.0, less than 0.75, less than 0.50, less than 0.25, less than 0.2, less than 0.15, or less than 0.1, wt. % based on the total weight of the antiseptic composition. Alternatively, the surfactant may be included in the antiseptic composition in an amount of from 0.01 to 2, 0.05 to 1.5, or 0.01 to 0.75, wt. % based on the antiseptic composition. The amount of surfactant may vary outside of the ranges above, but is typically both whole and fractional values within these ranges. Further, it is to be appreciated that more than one surfactant may be included in the antiseptic composition, in which case the total amount of all the surfactants included is within the above ranges.

The antiseptic composition may further comprise a pH adjuster. The pH adjuster may be any pH adjuster compatible for use in the antiseptic composition. The pH adjuster may be, by way of non-limiting example, adipic acid and derivatives thereof, glycine and derivatives thereof, citric acid and derivatives thereof, calcium hydroxide, magnesium aluminometasilicate, glucono delta lactone, or combinations thereof. In certain embodiments, the pH adjuster is glucono delta lactone. Of course, still other pH adjusters are contemplated.

When present, the pH adjuster may be included in the antiseptic composition in an amount less than 5 wt. % based on the total weight of the antiseptic composition. In another embodiment, the pH adjuster may be included in the antiseptic composition in an amount less than 2.5 wt. % based on the total weight of the antiseptic composition. In other embodiments, the pH adjuster may be included in the antiseptic composition in an amount less than 2.0, less than 1.5, less than 1.0, less than 0.75, less than 0.50, less than 0.25, less than 0.2, less than 0.15, or less than 0.1, wt. % based on the total weight of the antiseptic composition. Alternatively, the pH adjuster may be included in the antiseptic composition in an amount of from 0.01 to 2, 0.05 to 1.5, or 0.05 to 0.5, wt. % based on the antiseptic composition. The amount of pH adjuster may vary outside of the ranges above, but is typically both whole and fractional values within these ranges. Further, it is to be appreciated that more than one pH adjuster may be included in the antiseptic composition, in which case the total amount of all the pH adjusters included is within the above ranges.

The antiseptic composition may have any pH suitable for the antiseptic composition to be used to disinfect the skin or mucous membranes of a patient, particularly in view of the antibacterial agent included in the antiseptic composition. In one embodiment, the antiseptic composition may have a pH of from 4 to 6. In another other embodiment, the antiseptic composition may have a pH of from 4.2 to 5.2. In still other embodiment, the antiseptic composition may have a pH of from 4 to 8, of from 4 to 7, of from 4 to 6, or of from 4 to 5. The pH of the antiseptic composition may vary outside of the ranges above in specific embodiments, but is typically both whole and fractional values within these ranges.

The antiseptic composition may further comprise an odorant. The odorant may be any odorant suitable for use in the antiseptic composition. The odorant may be, by way of non-limiting example, perfumes, fragrances, ethereal oils, essences, scents, and combinations thereof. Of course, still other odorants are contemplated.

When present, the odorant may be included in the antiseptic composition in an amount less than 5 wt. % based on the total weight of the antiseptic composition. In another embodiment, the odorant may be included in the antiseptic composition in an amount less than 2.5 wt. % based on the total weight of the antiseptic composition. In other embodi-

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ments, the odorant may be included in the antiseptic composition in an amount less than 2.0, less than 1.5, less than 1.0, less than 0.75, less than 0.50, less than 0.25, less than 0.2, less than 0.15, or less than 0.1, wt. % based on the total weight of the antiseptic composition. Alternatively, the odorant may be included in the antiseptic composition in an amount of from 0.001 to 2, 0.005 to 1.5, or 0.005 to 0.5, wt. % based on the antiseptic composition. The amount of odorant may vary outside of the ranges above, but is typically both whole and fractional values within these ranges. Further, it is to be appreciated that more than one odorant may be included in the antiseptic composition, in which case the total amount of all the odorants included is within the above ranges.

The antiseptic composition may further comprise a colorant. The colorant may be any colorant suitable for use in the antiseptic composition. The colorant may be a synthetically derived colorant or a naturally derived colorant. The colorant may be, by way of non-limiting example, Brilliant Blue FCF, Fast Green FCF, indigo carmine, carmoisine lake, erythrosine, carmine lake, tartrazine, annatto, colorants produced by converting a naturally derived colorant to an aluminum or calcium salt, and combinations thereof. Of course, still other colorants are contemplated.

When present, the colorant may be included in the antiseptic composition in an amount less than 5 wt. % based on the total weight of the antiseptic composition. In another embodiment, the colorant may be included in the antiseptic composition in an amount less than 2.5 wt. % based on the total weight of the antiseptic composition. In other embodiments, the colorant may be included in the antiseptic composition in an amount less than 2.0, less than 1.5, less than 1.0, less than 0.75, less than 0.50, less than 0.25, less than 0.2, less than 0.15, or less than 0.1, wt. % based on the total weight of the antiseptic composition. Alternatively, the colorant may be included in the antiseptic composition in an amount of from 0.001 to 2, 0.005 to 1.5, or 0.005 to 0.5, wt. % based on the antiseptic composition. The amount of colorant may vary outside of the ranges above, but is typically both whole and fractional values within these ranges. Further, it is to be appreciated that more than one colorant may be included in the antiseptic composition, in which case the total amount of all the colorants included is within the above ranges.

The antiseptic composition may further comprise a stabilizer, a skin protectant, a preservative, or combinations thereof. When present, the stabilizer, the skin protectant, and/or the preservative may each be included in the antiseptic composition in amounts of less than 5 wt. % based on the total weight of the antiseptic composition. In another embodiment, the stabilizer, the skin protectant, and/or the preservative may each be included in the antiseptic composition in an amount less than 2.5 wt. % based on the total weight of the antiseptic composition. In other embodiments, the stabilizer, the skin protectant, and/or the preservative may be each included in the antiseptic composition in an amount less than 2.0, less than 1.5, less than 1.0, less than 0.75, less than 0.50, less than 0.25, less than 0.2, less than 0.15, or less than 0.1, wt. % based on the total weight of the antiseptic composition. Alternatively, the stabilizer, the skin protectant, and/or the preservative may each be included in the antiseptic composition in an amount of from 0.001 to 2, 0.01 to 1.5, or 0.01 to 0.5, wt. % based on the antiseptic composition. The amount of the stabilizer, the skin protectant, and/or the preservative may vary outside of the ranges above, but is typically both whole and fractional values within these ranges. Further, it is to be appreciated

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that more than one of the stabilizer, the skin protectant, and/or the preservative may be included in the antiseptic composition, in which case the total amount of all the stabilizers, the skin protectants, and/or the preservatives included is within the above ranges.

In one particular embodiment, the antiseptic composition includes less than 10, 5, 3, 1, 0.5, or 0.1, wt. % of an anionic compound. For configurations where the antibacterial agent comprises CHG, anionic compounds may compromise the efficacy of the antiseptic composition. As such, the selection of the components included in the antiseptic composition may account for this characteristic. For example, in embodiments where the antiseptic composition includes at least one of the humectant, the emollient, the surfactant, the pH adjuster, the odorant, the colorant, the stabilizer, the preservative, and/or the skin protectant, each of these components included may be non-ionic or cationic. In still further embodiments, the antiseptic composition may be free of an anionic compound other than the anionic compound(s) included as the antibacterial agent. In other words, no anionic compound may be included in the antiseptic composition, other than those anionic compounds of the antibacterial agent.

In some embodiments, the antiseptic composition is free of an alcohol having a boiling point less than 90° C. at 1.0 atm. By way of non-limiting example, an alcohol having a boiling point less than 90° C. at 1.0 atm may be ethanol or isopropyl alcohol. Alternatively, the antiseptic composition may include less than 5.0 wt. % alcohol having a boiling point less than 90° C. at 1.0 atm based on the total weight of the antiseptic composition. Alternatively still, the antiseptic composition includes less than 4.0 wt. %, less than 3.0 wt. %, less than 2.0 wt. %, or less than 1.0 wt. %, of alcohol having a boiling point less than 90° C. at 1.0 atm, each based on the total weight of the antiseptic composition. In these embodiments, the antiseptic composition is particularly suitable for disinfection of the skin or mucous membranes of a patient because the antiseptic composition does not dry the skin or mucous membranes of the patient. Moreover, the antiseptic composition may be applied to the skin or mucous membranes of a patient multiple times within a 24 hour period without concern for irritating the skin or mucous membranes of the patient due to dryness. However, despite the fact that an alcohol having a boiling point less than 90° C. at 1.0 atm is generally not necessary, in certain embodiments, the antiseptic composition may include an alcohol having a boiling point less than 90° C. at 1.0 atm in an amount of from 5 to 15 wt. % based on the total weight of the antiseptic composition.

The antiseptic composition may include less than 10, less than 7.5, less than 5.0, less than 2.5, less than 1.0, or less than 0.5 wt. % of an alcohol based on the total weight of the antiseptic composition. Alternatively, the antiseptic composition includes no amount of an alcohol. In these embodiments, the antiseptic composition is particularly suitable for disinfection of the skin or mucous membranes of a patient because the antiseptic composition does not dry the skin or mucous membranes of the patient. Of course, it will be appreciated that in some embodiments, alcohol may be included in the antiseptic composition in amounts greater than 10 wt. % based on the total weight of the antiseptic composition.

In some embodiments, the antiseptic composition is non-flammable. The antiseptic composition may be non-flammable such that the flash point of the antiseptic composition is at least 38° C., at least 60° C., or at least 93° C. In this

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manner, the antiseptic composition of the chlorhexidine article reduces the potential risk of fire that may be associated with other antiseptic compositions such as those that contain, for example, ethanol or isopropyl alcohol.

In one particular embodiment, the antiseptic composition comprises water in an amount of at least 50 wt. % based on the total weight of the antiseptic composition and chlorhexidine gluconate (CHG) in an amount of from 1.5 to 5.0 wt. % based on the total weight of the antiseptic composition. The CHG is dissolved in the water. In another embodiment, the antiseptic composition consists essentially of water in an amount of at least 50 wt. % based on the total weight of the antiseptic composition, chlorhexidine gluconate (CHG) in an amount of from 1.5 to 5.0 wt. % based on the total weight of the antiseptic composition, a humectant in an amount of from 3.0 to 10 wt. % based on the total weight of the antiseptic composition, an emollient in an amount less than 1.0 wt. % based on the total weight of the antiseptic composition, and optionally additives selected from the group consisting of a solvent, an antibacterial agent, a humectant, an emollient, a surfactant, a pH adjuster, an odorant, a colorant, or combinations thereof.

In various embodiments, the antiseptic composition is, comprises, or consists essentially of an antibacterial agent and a solvent. For example, in embodiments that "consist essentially of" the aforementioned components, the antiseptic composition may be free of the humectant, the emollient, the surfactant, the pH adjuster, the odorant, the colorant, the stabilizer, the skin protectant, the preservative, and/or combinations thereof. Alternatively, any one or more of these components may be included in an amount less than 25, 20, 15, 10, 5, 4, 3, 2, 1, 0.1, 0.05, 0.01, etc., wt. % or any range thereof, based on a total weight of the antiseptic composition. In various non-limiting embodiments, all values and ranges of values between the aforementioned values are hereby expressly contemplated.

It should be appreciated that the ranges provided above for each of the components of the antiseptic compositions may refer to the amounts of those components in the sterilized antiseptic compositions or the unsterilized antiseptic compositions. Because certain sterilization processes may cause certain components to degrade, the amount of each component in the antiseptic composition may vary from the non-sterile condition to the sterilized condition. As but one example, the description provided above should be understood to encompass the possibility that the sterilized antiseptic composition may comprise an amount of from 0.1 to 5 wt. % of the antibacterial agent, or alternatively, that the unsterilized antiseptic composition may comprise an amount of from 0.1 to 5 wt. % of the antibacterial agent.

Referring again to FIG. 4, in certain embodiments, the antiseptic composition is impregnated in the applicator 24. In some embodiments, when the antiseptic composition is impregnated in the applicator 24, the antiseptic composition may be dispersed evenly in the applicator 24 such that the concentration of the antiseptic composition is substantially the same (+/-1, 3, 5, or 10 wt. %) at all regions of the applicator 24. In other embodiments, the antiseptic composition may be impregnated in the applicator 24 such that a region of the applicator 24 may have a greater concentration of the antiseptic composition than another region. By way of non-limiting example, the antiseptic composition may be impregnated in the applicator 24 such that the concentration of the antiseptic composition is greater at a surface of the applicator 24 than beneath the surface of the applicator, or vice-versa.

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As will be described in further detail below, in some embodiments, when the antiseptic composition is impregnated in the applicator **24**, the antiseptic composition may be impregnated in the applicator **24** an amount of from 0.1 to 100 g per applicator. In another embodiment, the antiseptic composition may be impregnated in the applicator **24** in an amount of from 15 to 40 g per applicator. In other embodiments, the antiseptic composition may be impregnated in the applicator **24** in an amount of from 0.1 to 90, of from 0.1 to 80, of from 0.1 to 70, of from 0.1 to 60, of from 0.1 to 50, of from 0.1 to 40, of from 0.1 to 30, of from 0.1 to 20, of from 0.1 to 10, of from 0.1 to 5, or of from 0.1 to 2.5, g. In still other embodiments, the antiseptic composition may be impregnated in the applicator **24** in an amount of from 2.5 to 100, of from 5 to 100, of from 10 to 100, of from 20 to 100, of from 30 to 100, of from 40 to 100, of from 50 to 100, of from 60 to 100, of from 70 to 100, of from 80 to 100, of from 90 to 100, g. In still other embodiments, the antiseptic composition may be impregnated in the applicator **24** in an amount of from 5 to 50 g, of from 10 to 40, of from 15 to 30, or of from 22.5 to 27.5, g.

In some embodiments, the antiseptic composition may be impregnated in the applicator **24** in an amount of from 0.1 to 100 mL per applicator. In another embodiment, the antiseptic composition may be impregnated in the applicator **24** in an amount of from 15 to 40 mL per applicator. In other embodiments, the antiseptic composition may be impregnated in the applicator **24** in an amount of from 0.1 to 90, of from 0.1 to 80, of from 0.1 to 70, of from 0.1 to 60, of from 0.1 to 50, of from 0.1 to 40, of from 0.1 to 30, of from 0.1 to 20, of from 0.1 to 10, of from 0.1 to 5, or of from 0.1 to 2.5, mL. In still other embodiments, the antiseptic composition may be impregnated in the applicator **24** in an amount of from 2.5 to 100, of from 5 to 100, of from 10 to 100, of from 20 to 100, of from 30 to 100, of from 40 to 100, of from 50 to 100, of from 60 to 100, of from 70 to 100, of from 80 to 100, of from 90 to 100, mL. In still other embodiments, the antiseptic composition may be impregnated in the applicator **24** in an amount of from 5 to 50 g, of from 10 to 40, of from 15 to 30, or of from 22.5 to 27.5, mL.

The antiseptic composition may be impregnated in the applicator **24** in an amount such that the concentration of the antibacterial agent is therapeutically effective in each applicator. In one embodiment, the antiseptic composition is impregnated in the applicator **24** such that antibacterial agent is included in an amount of from 50 to 1000 mg per applicator **24**. In other embodiments, the antiseptic composition is impregnated in the applicator **24** such that antibacterial agent is included in an amount of from 100 to 900, 200 to 800, 300 to 700, 400 to 600, or 450 to 550, mg per applicator **24**. In certain embodiments, when CHG is the antibacterial agent, the antiseptic composition may be impregnated in the applicator **24** such that CHG is included in an amount of from 400 to 600 mg per applicator **24**.

In instances where the applicator is not impregnated, but rather includes a receptacle for retaining the antiseptic composition before activation by the caregiver, each receptacle may comprise the antiseptic composition in an amount of from 0.1 to 100, 15 to 40, 0.1 to 90, 0.1 to 80, 0.1 to 70, 0.1 to 60, 0.1 to 50, 0.1 to 40, 0.1 to 30, 0.1 to 20, 0.1 to 10, 0.1 to 5, 0.1 to 2.5, g per receptacle. The antiseptic composition may be included in the receptacle such that the antibacterial agent is included in an amount of from 100 to 900, 200 to 800, 300 to 700, 400 to 600, or 450 to 550, mg per receptacle.

In some embodiments, the chlorhexidine product may further comprise an insert. The insert may be disposed in the

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package to support the chlorhexidine article and insulate the chlorhexidine article. As an example, the insert may insulate the chlorhexidine article disposed in the package during heating of the chlorhexidine article prior to application of the chlorhexidine article to the skin or mucous membranes of a patient. Furthermore, the insert may be used to support the applicator when the applicator is impregnated with the antiseptic composition. In this manner, the insert may ensure the applicator does not become contaminated during impregnation of the antiseptic composition.

As will be described below, the chlorhexidine article **14** undergoes a sterilization process, such as a terminal sterilization process, to form a sterilized chlorhexidine article **14**. The chlorhexidine article **14** may be subjected to any sterilization process suitable to sterilize the chlorhexidine article **14** such that the sterility of the chlorhexidine article **14** can be validated. For example, the chlorhexidine article **14** may be subjected to heat sterilization, radiation sterilization, ethylene oxide gas sterilization, or combinations thereof.

In the context of this disclosure, when the chlorhexidine article **14** is sterilized, the components of the chlorhexidine article **14** are in a sterile condition, and that sterile condition has been validated, the resultant article is referred to as a sterilized chlorhexidine article **14**. Accordingly, when the chlorhexidine article **14** is in the sterile condition, the applicator **24**, the antiseptic composition, and components thereof, are referred to as a 'sterilized' applicator **24** and a 'sterilized' antiseptic composition, etc.

The sterile condition of the chlorhexidine article **14**, or components thereof, may be defined as sterile in accordance with one or more ISO standards. By way of non-limiting example, the sterilized chlorhexidine article **14** may be sterile in accordance with ISO 20857, ISO 17665, ISO 11135, and/or ISO 11137. In some embodiments, the sterilized chlorhexidine article **14** may be sterile in accordance with ISO 11137.

When the chlorhexidine article **14**, or components thereof, is exposed to a sterilization process, the sterilized chlorhexidine article **14**, or components thereof, has a Sterility Assurance Level (SAL) equal to or less than  $10^{-3}$ . In the context of this disclosure, "SAL" means the probability of a chlorhexidine article **14** being in a non-sterile condition after the chlorhexidine article **14** has been subjected to a sterilization process (and remains in the package **12** free from further external contamination).

In one aspect, the sterilization process may be understood as a step or sequence of steps that are sufficient to give the chlorhexidine article **14** a SAL equal to or less than  $10^{-3}$ . In certain embodiments, the sterilized chlorhexidine article **14** has a SAL equal to or less than  $10^{-6}$ . In other embodiments, the sterilized chlorhexidine article **14** has a SAL of from  $10^{-3}$  to  $10^{-12}$ , of from  $10^{-3}$  to  $10^{-9}$ , or of from  $10^{-3}$  to  $10^{-9}$ . In still other embodiments, the sterilized chlorhexidine article **14** has a SAL of from  $10^{-6}$  to  $10^{-12}$ , or of from  $10^{-9}$  to  $10^{-12}$ . In still other embodiments, the sterilized chlorhexidine article **14** has a SAL of less than  $10^{-9}$ , or less than  $10^{-12}$ . In some embodiments, the chlorhexidine article **14** has a SAL of from  $10^{-3}$  to  $10^{-9}$ . As described above, the components of the sterilized chlorhexidine article **14** may also have a SAL corresponding to the SAL of the sterilized chlorhexidine article **14**. For example, the sterilized water, the sterilized applicator **24**, and the other components of the sterilized article may have a SAL of from  $10^{-3}$  to  $10^{-12}$ , of from  $10^{-3}$  to  $10^{-9}$ , or of from  $10^{-3}$  to  $10^{-6}$ .

In one embodiment, when the chlorhexidine product **10** is subjected to a sterilization process, such as a terminal

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sterilization process, it will be appreciated that the package 12 is also subjected to the sterilization process in addition to the chlorhexidine article 14 disposed therein. However, as the external surface of the package 12 is exposed to the environment during subsequent handling (post-sterilizing), the external surface of the package 12 may not remain sterile even though the sterilized chlorhexidine article 14 does remain in the sterile condition. Despite the fact that the external surface of the package 12 may not remain sterile, the interior volume 16 of the package 12 remains sterile at least until the package 12 is opened. In the context of this disclosure, the term package 12 is used to refer to both a sterilized package 12 and a non-sterilized package 12.

When the chlorhexidine article is sterilized, the sterilized antiseptic composition may further comprise degradation impurities. The degradation impurities may be a result of exposing the chlorhexidine article to the sterilization process. When the sterilization process is heat sterilization, or radiation sterilization, and the antibacterial agent comprises CHG, the degradation impurities may include, by way of non-limiting example, N-[[6-[[[(4-chlorophenyl)carbamimidoyl]carbamimidoyl-amino]hexyl]carbamimidoyl]urea, N-(4-chlorophenyl)guanidine, N-(4-chlorophenyl)urea, 1-(6-aminohexyl)-5-(4-chlorophenyl)biguanide, N-(4-chlorophenyl)-N'-[[6-[[[(4-chlorophenyl)carbamimidoyl]carbamimidoyl]amino]hexyl]biguanide, 1-[6-(carbamimidoylamino)hexyl]-5-(4-chlorophenyl)-biguanide, p-chloroaniline, and combinations thereof. Of course still other degradation impurities of CHG are contemplated. Furthermore, degradation impurities for antibacterial agents other than CHG are also contemplated.

In one embodiment, the sterilized antiseptic composition is free from degradation impurities with a concentration having a toxicity unacceptable for topical skin applications according to ICH Q3. In one aspect, the sterilized antiseptic composition comprises less than 1, less than 0.1, less than 0.01, or less than 0.001 of a toxic degradation impurity.

When present, the degradation impurities may be included in the sterilized antiseptic composition in an amount less than 2.0 wt. % based on the total weight of the sterilized antiseptic composition. In another embodiment, the degradation impurities may be included in the sterilized antiseptic composition in an amount less than 5.0 wt. % based on the total weight of the sterilized antiseptic composition. In other embodiments, the degradation impurities may be included in the sterilized antiseptic composition in an amount less than 1.75, less than 1.5, less than 1.25, less than 1.0, less than 0.75, less than 0.5, less than 0.25, less than 0.2, less than 0.1, less than 0.05, less than 0.01, or less than 0.001 wt. % based on the total weight of the sterilized antiseptic composition. In still other embodiments, the degradation impurities may be included in the sterilized antiseptic composition in an amount of from 0.001 to 0.01, of from 0.001 to 0.1, of from 0.001 to 0.2, of from 0.001 to 0.25, of from 0.001 to 0.5, of from 0.001 to 0.75, of from 0.001 to 1.0, of from 0.001 to 1.25, of from 0.001 to 1.5, of from 0.001 to 1.75, or of from 0.001 to 2.0, wt. % based on the total weight of the sterilized antiseptic composition. The amount of degradation impurities may vary outside of the ranges above, but is typically both whole and fractional values within these ranges. Further, it is to be appreciated that more than one degradation impurity may be included in the antiseptic composition, in which case the total amount of all the degradation impurities included is within the above ranges.

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The present disclosure also provides a method of sterilizing a chlorhexidine article.

The method of sterilizing the chlorhexidine article 14 comprises providing the applicator and providing the antiseptic composition. In some embodiments, providing the antiseptic composition may further comprise providing the solvent, providing the antibacterial agent, and combining the solvent and the antibacterial agent to form the antiseptic composition. In other embodiments, providing the antiseptic composition may further comprise providing the solvent, providing the antibacterial agent, providing at least one of the humectant, the emollient, the surfactant, the pH adjuster, the odorant, the colorant, the stabilizer, the skin protectant, or the preservative, and combining the solvent, the antibacterial agent, and the at least one of the humectant, the emollient, the surfactant, the pH adjuster, the odorant, the colorant, the stabilizer, the skin protectant, or the preservative, to form the antiseptic composition. It is contemplated that when at least one of the humectant, the emollient, the surfactant, the pH adjuster, the odorant, the colorant, the stabilizer, the skin protectant, or the preservative is provided, the solvent and the at least one of the humectant, the emollient, the surfactant, the pH adjuster, the odorant, the colorant, the stabilizer, the skin protectant, or the preservative may be combined first followed by combining the antibacterial agent, or in any other suitable order of addition. In some embodiments, the antibacterial agent may be combined with a portion of the solvent to form an antibacterial agent concentrate. By way of non-limiting example, the antibacterial agent concentrate may be 20 wt. % CHG dissolved in water. When the antibacterial agent concentrate is formed, the antibacterial agent concentrate may be combined with the solvent, or the solvent and at least one of the humectant, the emollient, the surfactant, the pH adjuster, the odorant, the colorant, the stabilizer, the skin protectant, or the preservative, to form the antiseptic composition.

The method may further comprise impregnating the antiseptic composition in the applicator 24 to form the chlorhexidine article 14. The antiseptic composition may be impregnated in the applicator 24 in any amount described herein to form the chlorhexidine article 14. Impregnating may be performed by spraying the antiseptic composition on the applicator on one or multiple sides. The amount of antiseptic composition that is impregnated may be appropriately metered to ensure that the proper amount is provided in each applicator. As described above, the applicator 24 may be support by an insert during impregnation to ensure applicator does not become contaminated during impregnation. Alternatively, when the applicator comprises the receptacle for receiving the antiseptic composition, the method of sterilizing the chlorhexidine article may comprise filling the receptacle of the applicator with the antiseptic composition to form the chlorhexidine article.

Once the antiseptic composition has been impregnated in the applicator 24, the chlorhexidine article 14 can be encompassed in the package 12. In one possible embodiment, the package 12 is wrapped around the chlorhexidine article 14 and prepared for sealing. However, it should be appreciated that other ways of encompassing the chlorhexidine article 14 in the package 12 may also be used.

The method further comprises sealing the chlorhexidine article 14 inside the package 12 to form the chlorhexidine product 10. The chlorhexidine article 14 may be sealed inside the package 12 such that the chlorhexidine article 14 is hermetically sealed inside the package 12. The chlorhexidine article 14 may be sealed inside the package 12 in any suitable manner such as, by way of non-limiting example,

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heat sealing. Of course, other methods of sealing the chlorhexidine article 14 inside the package 12 are contemplated. In some embodiments, the method of sterilizing the chlorhexidine article 14 may further comprise disposing the chlorhexidine article 14 within the interior volume 16 of the package 12 prior to sealing the chlorhexidine article 14 inside the package 12. In other embodiments, the method of sterilizing the chlorhexidine article 14 may further comprise disposing the package 12 about the chlorhexidine article 14 prior to sealing the chlorhexidine article 14 inside the package 12. In another embodiment, sealing the chlorhexidine article 14 inside the package 12 may comprise shrink wrapping the chlorhexidine article 14.

The method may further comprise cooling the chlorhexidine product 10. Because the chlorhexidine article 14 is disposed within the interior volume 16 of the package 12 at this point, the step of cooling may be further understood to include the step of cooling the chlorhexidine article 14 and components thereof, including but not limited to, the solvent, the antibacterial agent, etc. Cooling the chlorhexidine product 10 may further comprise cooling the chlorhexidine product 10 such that at least a portion of the solvent of the antiseptic composition undergoes a phase change from a liquid state to a solid state.

Cooling the chlorhexidine product 10 may comprise cooling the chlorhexidine product 10 to a temperature of from  $-100^{\circ}\text{C}$ . to  $20^{\circ}\text{C}$ . In one embodiment, the chlorhexidine product 10 may be cooled to a temperature of from  $-30^{\circ}\text{C}$ . to  $3^{\circ}\text{C}$ . In another embodiment, the chlorhexidine product 10 may be cooled to a temperature of from  $-80^{\circ}\text{C}$ . to  $5^{\circ}\text{C}$ . In other embodiments, the chlorhexidine product 10 may be cooled to a temperature of from  $-90^{\circ}\text{C}$ . to  $20^{\circ}\text{C}$ ., of from  $-80^{\circ}\text{C}$ . to  $20^{\circ}\text{C}$ ., of from  $-70^{\circ}\text{C}$ . to  $20^{\circ}\text{C}$ ., of from  $-60^{\circ}\text{C}$ . to  $20^{\circ}\text{C}$ ., of from  $-50^{\circ}\text{C}$ . to  $20^{\circ}\text{C}$ ., of from  $-40^{\circ}\text{C}$ . to  $20^{\circ}\text{C}$ ., or of from  $-30^{\circ}\text{C}$ . to  $20^{\circ}\text{C}$ . In certain embodiments, the chlorhexidine product 10 may be cooled to a temperature equal to or less than the freezing point of the solvent in the antiseptic composition. By way of non-limiting example, if the solvent comprises water, the chlorhexidine product 10 may be cooled to a temperature equal to or less than  $0^{\circ}\text{C}$ . Other suitable solvents and melting points are contemplated such as, by way of non-limiting example, ethanol ( $-114^{\circ}\text{C}$ .), or isopropyl alcohol ( $-89^{\circ}\text{C}$ .). When the solvent comprises more than one solvent, the chlorhexidine product 10 may be cooled to a temperature equal to or less than the melting point of the one of the solvents in the antiseptic composition. In still other embodiments, the chlorhexidine product 10 may be cooled to a temperature of from  $-40^{\circ}\text{C}$ . to  $10^{\circ}\text{C}$ ., of from  $-35^{\circ}\text{C}$ . to  $5^{\circ}\text{C}$ ., of from  $-30^{\circ}\text{C}$ . to  $0^{\circ}\text{C}$ ., or of from  $-25^{\circ}\text{C}$ . to  $10^{\circ}\text{C}$ . In still other embodiments, the chlorhexidine product 10 may be cooled to a temperature of from  $-40^{\circ}\text{C}$ . to  $5^{\circ}\text{C}$ ., of from  $-40^{\circ}\text{C}$ . to  $0^{\circ}\text{C}$ ., of from  $-40^{\circ}\text{C}$ . to  $-5^{\circ}\text{C}$ ., of from  $-40^{\circ}\text{C}$ . to  $-10^{\circ}\text{C}$ ., of from  $-40^{\circ}\text{C}$ . to  $-15^{\circ}\text{C}$ ., or of from  $-25^{\circ}\text{C}$ . to  $-15^{\circ}\text{C}$ . Of course, still other temperatures are contemplated.

In one aspect, cooling the chlorhexidine product 10 may comprise cooling the chlorhexidine product 10 such that at least 50 wt. % of the solvent of the antiseptic composition undergoes a phase change from a liquid state to a solid state. In another embodiment, cooling the chlorhexidine product 10 may comprise cooling the chlorhexidine product 10 such that at least 0.1 wt. % of the solvent of the antiseptic composition undergoes a phase change from a liquid state to a solid state. In other embodiments, cooling the chlorhexidine product 10 may comprise cooling the chlorhexidine product 10 such that at least 1, at least 5, at least 10, at least 15, at least 20, at least 30, at least 40, at least 50, at least 60,

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at least 70, at least 80, at least 90, at least 95, or at least 99, wt. % of the solvent undergoes a phase change from a liquid state to a solid state. In certain embodiments, cooling the chlorhexidine product 10 may comprise cooling the chlorhexidine product 10 such that all of the solvent undergoes a phase change from a liquid state to a solid state. Alternatively, cooling the chlorhexidine product 10 may comprise cooling the chlorhexidine product 10 such that none of the solvent undergoes a phase change from a liquid state to a solid state. In still other embodiments, cooling the chlorhexidine product 10 may comprise cooling the chlorhexidine product 10 such that less than 99, less than 95, less than 90, less than 80, less than 70, less than 60, less than 50, less than 40, less than 30, less than 20, less than 10, less than 5, or less than 1, wt. % of the solvent undergoes a phase change from a liquid state to a solid state.

The cooling of the chlorhexidine product 10 may be performed at atmospheric pressure. By way of non-limiting example, the cooling of the chlorhexidine product 10 may be performed at a pressure of at least 1 atm. In other embodiments, the cooling of the chlorhexidine product 10 may be performed at a pressure of from 0.8 to 1.2, of from 0.9 to 1.1, or of from 0.95 to 1.05, atm. Furthermore, once the cooling of the chlorhexidine product 10 is complete the chlorhexidine product 10 may not be exposed to pressures below atmospheric pressure. By way of non-limiting example, after cooling the chlorhexidine product 10 the chlorhexidine product 10 may not be exposed to pressures less than 0.95, less than 0.9, less than 0.8, or less than 0.5, atm. In this manner, the chlorhexidine product 10 is not subjected to lyophilization (also known as freeze-drying).

With continued respect to cooling the chlorhexidine product 10, when a plurality of chlorhexidine articles 14 are included in the package 12, cooling the chlorhexidine product 10 may further comprise cooling the chlorhexidine product 10 such that at least a portion of the solvent in the antiseptic composition of each chlorhexidine article 14 undergoes a phase change from a liquid state to a solid state. In another embodiment, when a plurality of chlorhexidine products 10 are disposed in the shipping container 22, cooling the chlorhexidine product 10 may further comprise cooling the shipping container 22 such that at least a portion of the solvent in the antiseptic composition of each chlorhexidine article 14 in each package 12 undergoes a phase change from a liquid state to a solid state.

With continued respect to cooling the chlorhexidine product 10, the chlorhexidine product 10 may be cooled by any suitable cooling unit 26. By way of non-limiting example, the cooling unit 26 may be a freezer, a refrigerator, a walk-in freezer, a walk-in cooler, a tunnel blast freezer, or a refrigerated warehouse. Alternatively, the cooling unit 26 may dispense liquid refrigerant such as by way of non-limiting example, liquid nitrogen, liquid nitrous oxide, or liquid carbon dioxide. With reference to FIG. 7A, in one embodiment, the cooling unit 26 is a tunnel blast freezer 26. The tunnel blast freezer 26 may be arranged about a conveyor mechanism 28 to facilitate efficient cooling of the shipping container 22 and the plurality of chlorhexidine products 10 disposed therein. Likewise, as shown in FIG. 7B, the conveyor mechanism may be used to efficiently cool single chlorhexidine products 10 instead of the plurality of chlorhexidine products 10 disposed in the shipping container 22. In other embodiments, a plurality of shipping containers and the chlorhexidine products 10 disposed therein may be cooled in a freezer, or a walk-in freezer.

The method further comprises sterilizing the chlorhexidine product 10 to form the sterilized chlorhexidine article

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14. The chlorhexidine product 10 may be sterilized by any sterilization process such that the sterility of the chlorhexidine article 14 can be verified. In some embodiments, sterilizing the chlorhexidine product 10 comprises irradiating the chlorhexidine product 10 to form a sterilized chlorhexidine article 14.

In other embodiments, sterilizing the chlorhexidine product 10 further comprises heat sterilizing the chlorhexidine product 10. Of course it should be appreciated that the antibacterial agent of the antiseptic composition may not be compatible with heat sterilization. For example, heat sterilization is known to be unsuitable for antiseptic compositions comprising CHG in an amount of greater than 1.0 wt. % based on the total weight of the antiseptic composition because of the degradation of CHG at temperatures required for heat sterilizing. Heat sterilizing may also be incompatible with the applicator 24 and/or package 12 of the chlorhexidine product 10.

In certain embodiments, depending on the chosen antibacterial agent, the method may be free of a heating step that results in the temperature of the chlorhexidine article 14 being raised above 35, 40, 50, 60, or 70, ° C. In other embodiments, the method may be free of a heating step that results in the temperature of the chlorhexidine article 14 being raised above 30° C. In still other embodiments, the method may be free of a heating step that results in the temperature of the chlorhexidine article 14 to be raised such that the chlorhexidine article 14 is considered sterile in accordance with ISO 20857, or ISO 17665. In still other embodiments, the method may be free of a heating step that results in the temperature of the chlorhexidine article 14 being raised to a temperature of from 35 to 150, of from 50 to 150, of from 50 to 130, or of from 75 to 130, ° C.

When the method comprises irradiating the chlorhexidine product 10 to form the sterilized chlorhexidine article 14, irradiating the chlorhexidine product 10 may comprise irradiating the chlorhexidine product 10 with a radiation type selected from the group comprising gamma radiation, electron-beam radiation, x-ray radiation, or combinations thereof. In certain embodiments, the radiation type is electron-beam radiation.

The chlorhexidine product 10 may be irradiated with the radiation type by any suitable radiation unit. With reference to FIGS. 7A and 7B, in the illustrated embodiment, the radiation unit 30 is an irradiator 30. The radiation unit 30 may be arranged in any suitable manner to efficiently irradiate the chlorhexidine product 10. As an example, in the illustrated embodiments, the irradiator 30 is disposed adjacent the conveyor mechanism 28 such that either of the chlorhexidine product 10, or the plurality of chlorhexidine products 10 disposed in the shipping container 22, may be efficiently irradiated. With reference to FIG. 7A, the radiation unit 30 may be disposed adjacent the conveyor mechanism 28 downstream of the cooling unit 26 for efficiently cooling the plurality of chlorhexidine products 10 disposed in the shipping container 22 and subsequently irradiating the plurality of chlorhexidine products 10 disposed in the shipping container 22. Likewise, as shown in FIG. 7B, the conveyor mechanism 28 may also be used for efficiently cooling and irradiating only a single chlorhexidine product 10. It will further be appreciated that in some embodiments, the plurality of chlorhexidine products 10 may be irradiated simultaneously and not disposed in the shipping container 22. Of course, it will be appreciated that cooling the chlorhexidine product 10 may occur separately from irradiating the chlorhexidine product 10. In some embodiments, the irradiator 30 may be arranged about an irradiation platform

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such that chlorhexidine products can be placed on the irradiation platform and irradiated. Of course other arrangements of the irradiator 30 are contemplated.

When the radiation unit 30 is the irradiator 30, the irradiator 30 may be, by way of non-limiting example, an x-ray generator, a gamma ray irradiator, an electron-beam accelerator, or combinations thereof. Of course, still other irradiators 30 are contemplated.

In some embodiments, when the chlorhexidine product 10 is irradiated with a radiation type, irradiating the chlorhexidine product 10 may further comprise irradiating the chlorhexidine product 10 with a radiation dose of from 5 to 25 kGy to form the sterilized chlorhexidine article 14. In another embodiment, irradiating the chlorhexidine product 10 may further comprise irradiating the chlorhexidine product 10 with a radiation dose of from 1 to 100 kGy. In still other embodiment, irradiating the chlorhexidine product 10 may further comprise irradiating the chlorhexidine product 10 with a radiation dose of from 1 to 30 kGy. In other embodiments, irradiating the chlorhexidine product 10 may further comprise irradiating the chlorhexidine product 10 with a radiation dose of from 1 to 55, of from 5 to 30, of from 10 to 25, or of from 10 to 20, of from 8 to 12, or of from 9 to 13, kGy. In still other embodiments, irradiating the chlorhexidine product 10 may further comprise irradiating the chlorhexidine product 10 with a radiation dose of at least 1, at least 5, at least 10, at least 15, at least 20, at least 25, at least 30, at least 50, or at least 100, kGy. In still other embodiments, irradiating the chlorhexidine product 10 may further comprise irradiating the chlorhexidine product 10 with a radiation dose of less than 100, less than 50, less than 30, less than 25, less than 20, less than 15, less than 10, less than 5, or less than 1, kGy. In still other embodiments, irradiating the chlorhexidine product 10 may further comprise irradiating the chlorhexidine product 10 with a radiation dose of 5, 10, 15, 20, 25, or 30, kGy. Of course, still other radiation doses are contemplated.

Irradiating the chlorhexidine product 10 may further comprise irradiating the chlorhexidine product 10 with a plurality of radiation doses. The plurality of radiation doses may be any number of radiation doses suitable to sterilize the chlorhexidine product 10. By way of non-limiting example, the plurality of doses may be of from 2 to 5, of from 2 to 4, or of from 2 to 3, radiation doses. The chlorhexidine product 10 may be subjected to the plurality of radiation doses within 7, within 6, within 5, within 3, within 3, within 2, or within 1, days. In other embodiments, the chlorhexidine product 10 may be subjected to the plurality of radiation doses within 20, within 15, within 10, or within 5, hours. In one embodiment, the chlorhexidine product 10 may be subjected to one of the plurality of radiation doses immediately after another of the plurality of radiation doses. Each of the plurality of radiation doses may be a radiation dose of from 5 to 25 kGy, or any of the radiation dose ranges described herein.

With continued respect to irradiating the chlorhexidine product 10, irradiating the chlorhexidine product 10 may further comprise irradiating the chlorhexidine product 10 while at least a portion of the solvent is in the solid state to form the sterilized chlorhexidine article 14. In some embodiments, irradiating the chlorhexidine product 10 may further comprise irradiating the chlorhexidine product 10 while at least 50 wt. % of the solvent is in the solid state. In another embodiment, irradiating the chlorhexidine product 10 may further comprise irradiating the chlorhexidine product 10 while at least 75 wt. % of the solvent is in the solid state. In other embodiments, irradiating the chlorhexidine product 10



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may further comprise irradiating the chlorhexidine product **10** while at least 1, at least 5, at least 10, at least 15, at least 20, at least 30, at least 40, at least 60, at least 70, at least 80, at least 90, at least 95, or at least 99, wt. % of the solvent is in the solid state. In certain embodiments, irradiating the chlorhexidine product **10** may further comprise irradiating the chlorhexidine product **10** while all of the solvent is in the solid state. Alternatively, irradiating the chlorhexidine product **10** may further comprise irradiating the chlorhexidine product **10** while none of the solvent is in the solid state irradiating the chlorhexidine product **10** may further comprise irradiating the chlorhexidine product **10** while less than 99, less than 95, less than 90, less than 80, less than 70, less than 60, less than 50, less than 40, less than 30, less than 20, less than 10, less than 5, or less than 1, wt. % of the solvent is in the solid state.

In some embodiments, the amount of solvent in the solid state when the chlorhexidine product **10** is irradiated is the same as the amount of solvent that undergoes a phase change from the liquid state to the solid state when the chlorhexidine product **10** is cooled. For example, with reference to FIGS. 7A and 7B, when the radiation unit **30** is arranged downstream of the cooling unit **26** on the conveyor mechanism **28**, the amount of solvent in the solid state when the chlorhexidine products are irradiated is the same, substantially the same, or slightly less than, the amount of solvent that undergoes a phase change from the liquid state to the solid state during cooling of the chlorhexidine products **10**. Alternatively, the radiation unit may be arranged separately from the cooling unit. When the radiation unit is arranged separately from the cooling unit, the radiation unit may be arranged in a cooled environment to ensure the amount of solvent in the solid state when the chlorhexidine products **10** are irradiated is the same, substantially the same, or slightly less than, the amount of solvent that undergoes a phase change from the liquid state to the solid state during cooling of the chlorhexidine products **10**. Of course, the radiation unit may be arranged in a room temperature environment.

In other embodiments, the amount of solvent in the solid state when the chlorhexidine product **10** is irradiated is different to the amount of solvent that undergoes a phase change from the liquid state to the solid state when the chlorhexidine product **10** is cooled.

In some embodiments, the sterilized antibacterial agent in the sterilized antiseptic composition has a purity of at least 90% after irradiating the chlorhexidine product **10** to form the sterilized chlorhexidine article **14**. In the context of this disclosure, the purity of the sterilized antibacterial agent is the amount of sterilized antibacterial agent in the sterilized antiseptic composition after sterilizing the chlorhexidine product **10** divided by the sum of the amount of sterilized antibacterial agent and degradation impurities in the sterilized antiseptic composition after sterilizing the chlorhexidine product **10**, expressed as a percentage. The purity may be expressed in the following formula:

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$$\text{purity} = \frac{\text{amount of sterilized antibacterial agent in the sterilized antiseptic composition}}{(\text{amount of sterilized antibacterial agent in the sterilized antiseptic composition} + \text{amount of degradation impurities in the sterilized antiseptic composition})} \times 100.$$

For example a purity of 98% indicates that the sterilized antiseptic composition comprises 98 parts of the sterilized antibacterial agent in the sterilized antiseptic composition and 2 parts of the degradation impurities in the sterilized antiseptic composition. In another embodiment, the sterilized antibacterial agent in the sterilized antiseptic composition has a purity of at least 50%. In other embodiments, the sterilized antibacterial agent in the sterilized antiseptic composition has a purity of at least 60%, of at least 70%, of at least 80%, of at least 90%, of at least 92.5%, of at least 95%, of at least 97.5%, of at least 99%, of at least 99.5%, or of at least 99.9%. In certain embodiments, the sterilized antibacterial agent in the sterilized antiseptic composition has a purity of 100%. In other words, the sterilized antiseptic composition does not comprise any degradation impurities. In still other embodiments, the sterilized antibacterial agent in the antiseptic composition has purity of from 85 to 99.5%, of from 87.5 to 99.5%, or of from 87.5 to 97.5%. Of course, still other purities of the sterilized antibacterial agent of the sterilized antiseptic composition are contemplated.

In some embodiments, the sterilized antibacterial agent in the sterilized antiseptic composition is present in an amount at least 90% of the amount of the antibacterial agent in the antiseptic composition before sterilizing the chlorhexidine product **10**. In another embodiment, the sterilized antibacterial agent in the sterilized antiseptic composition is present in an amount at least 85% of the amount of the antibacterial agent in the antiseptic composition before sterilizing the chlorhexidine product **10**. In still other embodiments, the sterilized antibacterial agent in the sterilized antiseptic composition is present in an amount at least 50%, at least 60%, at least 70%, at least 80%, at least 92.5%, at least 95%, at least 97.5%, at least 99%, at least 99.5%, at least 99.9%, of the amount of the antibacterial agent in the antiseptic composition before sterilizing the chlorhexidine product **10**. In certain embodiments, the sterilized antibacterial agent in the sterilized antiseptic composition is present in an amount equal to the amount of the antibacterial agent in the antiseptic composition before sterilizing the chlorhexidine product **10**. In still other embodiments, the sterilized antibacterial agent in the sterilized antiseptic composition is present in an amount of from 85 to 99.5%, of from 87.5 to 99.5%, or of from 87.5 to 97.5%, of the antibacterial agent in the antiseptic composition before sterilizing the chlorhexidine product **10**. Of course, it is contemplated the sterilized antibacterial agent in the sterilized antiseptic composition is present in still other amounts.

In some embodiments, the antibacterial agent may be included in the antiseptic composition in an amount greater than the desired amount of the sterilized antibacterial agent in the sterilized antiseptic composition. In this manner, if the amount of antibacterial agent decreases during sterilization, there may still be a therapeutically effective amount of the

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sterilized antibacterial agent included in the sterilized antiseptic composition. In one embodiment, the antibacterial agent may be included in an amount less than 35% greater than the desired amount of the sterilized antibacterial agent included in the sterilized antiseptic composition. In another embodiment, the antibacterial agent may be included in the antiseptic composition an amount of from 15 to 25% greater than the desired amount of the sterilized antibacterial agent included in the sterilized antiseptic composition. In still other embodiments, the antibacterial agent may be included in the antiseptic composition an amount less than 5%, less than 10%, less than 15%, less than 20%, less than 25%, less than 30%, less than 40%, less than 50%, less than 60%, less than 70%, less than 80%, less than 90%, less than 100%, less than 200%, or less than 500%, greater than the desired amount of the sterilized antibacterial agent included in the sterilized antiseptic composition. In still other embodiments, the antibacterial agent may be included in the antiseptic composition an amount more than 5%, more than 10%, more than 15%, more than 20%, more than 25%, more than 30%, more than 40%, more than 50%, more than 60%, more than 70%, more than 80%, more than 90%, more than 100%, more than 200%, or more than 500%, greater than the desired amount of the sterilized antibacterial agent included in the sterilized antiseptic composition. Of course, the antibacterial agent may be included in the antiseptic composition in still other amounts greater than the desired amount of the sterilized antibacterial agent in the sterilized antiseptic composition.

When the antibacterial agent is included in the antiseptic composition amounts greater than the desired amount of the sterilized antibacterial agent in the sterilized antiseptic composition, the sterilized antibacterial agent may be included in the sterilized antiseptic composition in an amount of from 0.1 to 10 wt. % based on the total weight of the sterilized antiseptic composition. In another embodiment, the sterilized antibacterial agent may be included in an amount of from 1.5 to 5.0 wt. % based on the total weight of the sterilized antiseptic composition. In other embodiments, the sterilized antibacterial agent may be included in an amount of from 0.5 to 10, of from 1.0 to 10, of from 1.5 to 10, of from 2.0, to 10, of from 2.5 to 10, of from 3.0 to 10, of from 3.5 to 10, of from 4.0 to 10, of from 4.5 to 10, of from 5.0 to 10, of from 5.5 to 10, of from 6.0 to 10, of from 6.5 to 10, of from 7.0 to 10, of from 7.5 to 10, of from 8.0 to 10, of from 8.5 to 10, of from 9.0 to 10, or of from 9.5 to 10 wt. % based on the total weight of the sterilized antiseptic composition. In still other embodiments, the sterilized antibacterial agent may be included in the sterilized antiseptic composition in an amount of from 0.1 to 9.5, of from 0.1 to 9.0, of from 0.1 to 8.5, of from 0.1 to 8.0, of from 0.1 to 7.5, of from 0.1 to 7.0, of from 0.1 to 6.5, of from 0.1 to 6.0, of from 0.1 to 5.5, of from 0.1 to 5.0, of from 0.1 to 4.5, of from 0.1 to 4.0, of from 0.1 to 3.5, of from 0.1 to 3.0, of from 0.1 to 2.5, of from 0.1 to 2.0, of from 0.1 to 1.5, of from 0.1 to 1.0, or of from 0.1 to 0.5, wt. % based on the total weight of the sterilized antiseptic composition. In still other embodiments, the sterilized antibacterial agent may be included in the sterilized antiseptic composition in an amount of from 0.5 to 8.0, of from 1.0 to 6.0, of from 1.5 to 5.0, of from 1.8 to 4.5, of from 1.8 to 3.5, or of from 1.8 to 2.5, wt. % based on the total weight of the sterilized antiseptic composition. Of course, the sterilized antibacterial agent may be included in the sterilized antiseptic composition in still other amounts.

In one embodiment, the method of sterilizing a chlorhexidine article comprises providing an applicator. The method further comprises, providing an antiseptic composition com-

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prising water in an amount of from 50 wt. % based on the total weight of the antiseptic composition and CHG in an amount of from 1.5 to 5.0 wt. % based on the total weight of the antiseptic composition. The method further comprises, impregnating the antiseptic composition in the applicator to form the chlorhexidine article. The method further comprises sealing the chlorhexidine article inside the package to form the chlorhexidine product. The method further comprises cooling the chlorhexidine product such that at least a portion of the water of the antiseptic composition undergoes a phase change from the liquid state to the solid state. The method further comprises irradiating the chlorhexidine product while at least a portion of the water is in the solid state to form the sterilized chlorhexidine article.

In another embodiment, the method of sterilizing a chlorhexidine article comprises providing the chlorhexidine product. The method also comprises cooling the chlorhexidine product such that at least a portion of the solvent of the antiseptic composition undergoes a phase change from a liquid state to a solid state. The method further comprises irradiating the chlorhexidine product while at least a portion of the solvent is in the solid state to form a sterilized chlorhexidine article.

One or more of the values described above may vary by  $\pm 5\%$ ,  $\pm 10\%$ ,  $\pm 15\%$ ,  $\pm 20\%$ ,  $\pm 25\%$ , etc. so long as the variance remains within the scope of the disclosure. Each member may be relied upon individually and or in combination and provides adequate support for specific embodiments within the scope of the appended claims. The subject matter of all combinations of independent and dependent claims, both singly and multiply dependent, is herein expressly contemplated. The disclosure is illustrative including words of description rather than of limitation. Many modifications and variations of the present disclosure are possible in light of the above teachings, and the disclosure may be practiced otherwise than as specifically described herein.

All combinations of the aforementioned embodiments throughout the entire disclosure are hereby expressly contemplated in one or more non-limiting embodiments even if such a disclosure is not described verbatim in a single paragraph or section above. In other words, an expressly contemplated embodiment may include any one or more elements described above selected and combined from any portion of the disclosure

It is also to be understood that any ranges and subranges relied upon in describing various embodiments of the present disclosure independently and collectively fall within the scope of the appended claims, and are understood to describe and contemplate all ranges including whole and/or fractional values therein, even if such values are not expressly written herein. One of skill in the art readily recognizes that the enumerated ranges and subranges sufficiently describe and enable various embodiments of the present disclosure, and such ranges and subranges may be further delineated into relevant halves, thirds, quarters, fifths, and so on. As just one example, a range "of from 0.1 to 0.9" may be further delineated into a lower third, i.e. from 0.1 to 0.3, a middle third, i.e. from 0.4 to 0.6, and an upper third, i.e. from 0.7 to 0.9, which individually and collectively are within the scope of the appended claims, and may be relied upon individually and/or collectively and provide adequate support for specific embodiments within the scope of the appended claims. In addition, with respect to the language which defines or modifies a range, such as "at least," "greater than," "less than," "no more than," and the like, it is to be understood that such language includes

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subranges and/or an upper or lower limit. As another example, a range of "at least 10" inherently includes a subrange of from at least 10 to 35, a subrange of from at least 10 to 25, a subrange of from 25 to 35, and so on, and each subrange may be relied upon individually and/or collectively and provides adequate support for specific embodiments within the scope of the appended claims. Finally, an individual number within a disclosed range may be relied upon and provides adequate support for specific embodiments within the scope of the appended claims. For example, a range "of from 1 to 9" includes various individual integers, such as 3, as well as individual numbers including a decimal point (or fraction), such as 4.1, which may be relied upon and provide adequate support for specific embodiments within the scope of the appended claims.

Several embodiments have been discussed in the foregoing description. However, the embodiments discussed herein are not intended to be exhaustive or limit the invention to any particular form. The terminology which has been used is intended to be in the nature of words of description rather than of limitation. Many modifications and variations are possible in light of the above teachings and the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A sterilized chlorhexidine product for topical disinfection, said sterilized chlorhexidine product comprising:

a sterilized chlorhexidine gluconate composition; an applicator for facilitating application of the sterilized chlorhexidine composition; and

a receptacle containing the sterilized chlorhexidine gluconate composition to provide the sterilized chlorhexidine gluconate composition to impregnate the applicator when the receptacle is compromised;

wherein the sterilized chlorhexidine gluconate composition comprises chlorhexidine gluconate and alcohol.

2. The sterilized chlorhexidine product of claim 1, wherein the receptacle contains the sterilized chlorhexidine gluconate composition in an amount between 0.1 and 100 mL.

3. The sterilized chlorhexidine product of claim 1, wherein the sterilized chlorhexidine gluconate composition comprises chlorhexidine gluconate in an amount of from 1.5 to 5.0 wt. % based on the total weight of said sterilized antiseptic composition and the alcohol in an amount of at least 50 wt. % based on a total weight of said sterilized antiseptic composition.

4. The sterilized chlorhexidine product of claim 3, wherein the sterilized chlorhexidine gluconate composition comprises chlorhexidine gluconate in an amount of 2.0 wt. % based on the total weight of said sterilized antiseptic composition and the alcohol in an amount of 70 wt. % based on a total weight of said sterilized antiseptic composition.

5. The sterilized chlorhexidine product of claim 1, wherein the alcohol is isopropyl alcohol.

6. The sterilized chlorhexidine product of claim 1, wherein the sterilized chlorhexidine gluconate composition further comprises water.

7. The sterilized chlorhexidine product of claim 1, wherein the sterilized chlorhexidine gluconate composition further comprises one or more additives selected from the

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group consisting of a sterilized surfactant, a sterilized pH adjuster, a sterilized odorant, a sterilized colorant, a sterilized stabilizer, a sterilized skin protectant, a sterilized preservative, or combinations thereof.

8. The sterilized chlorhexidine product of claim 7, wherein the additive is a colorant.

9. The sterilized chlorhexidine product of claim 7, wherein the additive is a skin protectant.

10. The sterilized chlorhexidine product of claim 1, wherein said sterilized chlorhexidine article has a sterility assurance level of from  $10^{-3}$  to  $10^{-9}$ .

11. The sterilized chlorhexidine product of claim 1, wherein the applicator comprises a foam.

12. A method of using a sterilized chlorhexidine article, said method comprising:

providing a sterilized chlorhexidine article, the sterilized chlorhexidine article comprising:

a sterilized chlorhexidine gluconate composition comprising chlorhexidine gluconate and alcohol;

an applicator for facilitating application of the sterilized chlorhexidine; and

a receptacle containing the sterilized chlorhexidine gluconate composition;

compromising the receptacle to provide the sterilized chlorhexidine gluconate composition to impregnate the applicator; and

applying the sterilized chlorhexidine gluconate composition to a patient's skin.

13. The method of claim 12, wherein when the receptacle is compromised, the applicator is impregnated with 0.1 to 100 mL of the sterilized chlorhexidine gluconate composition.

14. The method of claim 12, wherein the sterilized chlorhexidine gluconate composition comprises chlorhexidine gluconate in an amount of from 1.5 to 5.0 wt. % based on the total weight of said sterilized antiseptic composition and the alcohol in an amount of at least 50 wt. % based on a total weight of said sterilized antiseptic composition.

15. The method of claim 12, wherein the alcohol is isopropyl alcohol.

16. The method of claim 12, wherein the sterilized chlorhexidine gluconate composition further comprises water.

17. The method of claim 12, wherein the sterilized chlorhexidine gluconate composition further comprises one or more additives selected from the group consisting of a sterilized surfactant, a sterilized pH adjuster, a sterilized odorant, a sterilized colorant, a sterilized stabilizer, a sterilized skin protectant, a sterilized preservative, or combinations thereof.

18. The method of claim 17, wherein the additive is a colorant.

19. The method of claim 17, wherein the additive is a skin protectant.

20. The method of claim 12, wherein said sterilized chlorhexidine article has a sterility assurance level of from  $10^{-3}$  to  $10^{-9}$ .

\* \* \* \* \*



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**Allen et al.**

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(54) **STERILIZED CHLORHEXIDINE ARTICLE  
AND METHOD OF STERILIZING A  
CHLORHEXIDINE ARTICLE**

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**A61K 9/00** (2006.01)

(52) **U.S. Cl.**

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A01N 43/40; A01N 2300/00; A01N  
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25/08; A01N 33/12; A01N 55/02; A01N  
25/04; A61K 31/155; A61K 31/14; A61K  
31/045; A61K 31/22; A61K 2300/00;  
A61K 33/38; A61K 47/10; A61K 31/085;  
A61K 31/185; A61K 31/191; A61K  
31/194; A61K 31/685; A61K 31/785;  
A61K 45/06; A61K 47/183; A61K  
47/186; A61K 9/0014; A61K 9/0019;  
A61K 31/00; A61K 31/205; A61K 47/34;  
A61K 8/0208; A61K 8/345; A61K 8/43;  
A61K 9/06; A61K 9/122; A61L 26/0023;  
A61L 2300/404; A61L 2/0023; A61L  
2/28; A61L 26/0014; A61L 2/04; A61L  
26/0052; A61L 27/34; A61L 27/54; A61L  
2/087; A61L 2202/21; A61L 2300/402;  
A61L 2300/414; A61L 2/081; A61L  
15/32; A61L 15/38; A61L 15/40; A61L  
15/46; A61L 2202/181; A61L 2300/204;  
A61L 2300/236; A61L 2300/252; A61L  
2300/254; A61L 2300/606; A61L  
2300/61; A61L 2300/802; A61L 24/0015;  
A61L 24/0021; A61L 24/0031; A61L

27/3604; A61L 27/3683; A61L 27/50;  
A61L 27/56; A61L 2/0035; A61L 2/082;  
A61L 2/18; A61L 15/28; A61L 15/42;  
A61L 15/425; A61L 15/44; A61L 15/62;  
A61L 2202/22; A61L 2202/24; A61L  
2202/26; A61L 2300/222; A61L  
2300/406; A61L 2300/602; A61L  
2300/62; A61L 2/0005; A61L 2/0011;  
A61L 2/007; A61L 2/0088; A61L 2/08;  
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See application file for complete search history.

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(57) **ABSTRACT**

The present disclosure provides a sterilized chlorhexidine product for topical disinfection. The product includes a sterilized chlorhexidine gluconate composition, an applicator for facilitating application of the sterilized chlorhexidine composition, and a barrier configured to be compromised to impregnate the applicator with the sterilized chlorhexidine gluconate composition. The sterilized chlorhexidine gluconate composition includes chlorhexidine gluconate and alcohol.

**19 Claims, 5 Drawing Sheets**

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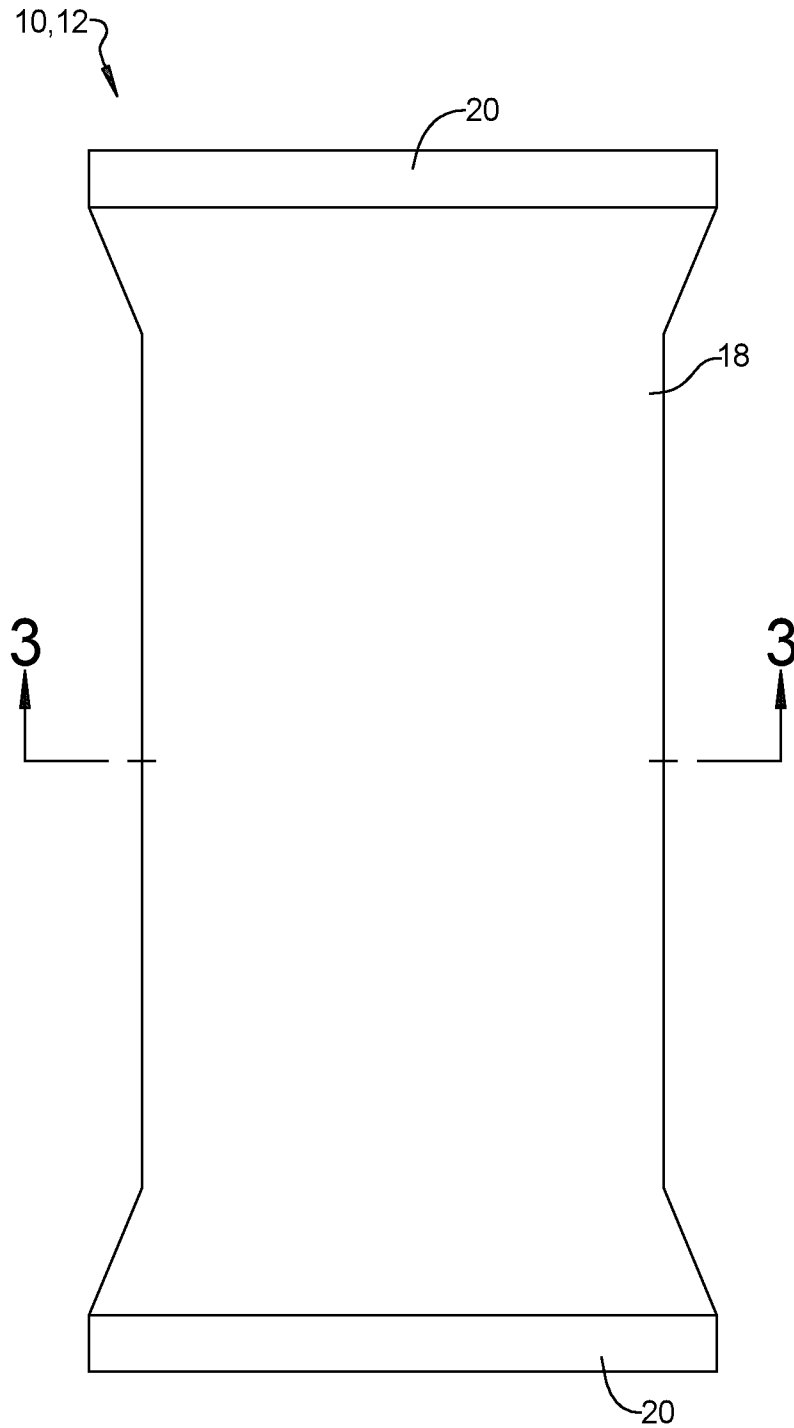


FIG. 1

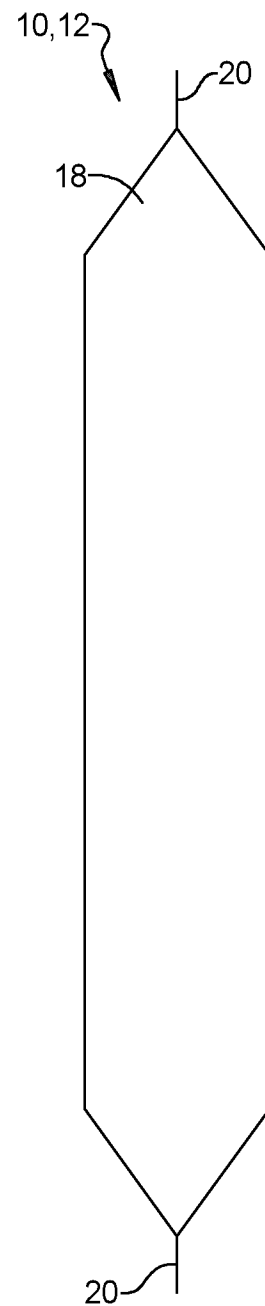


FIG. 2

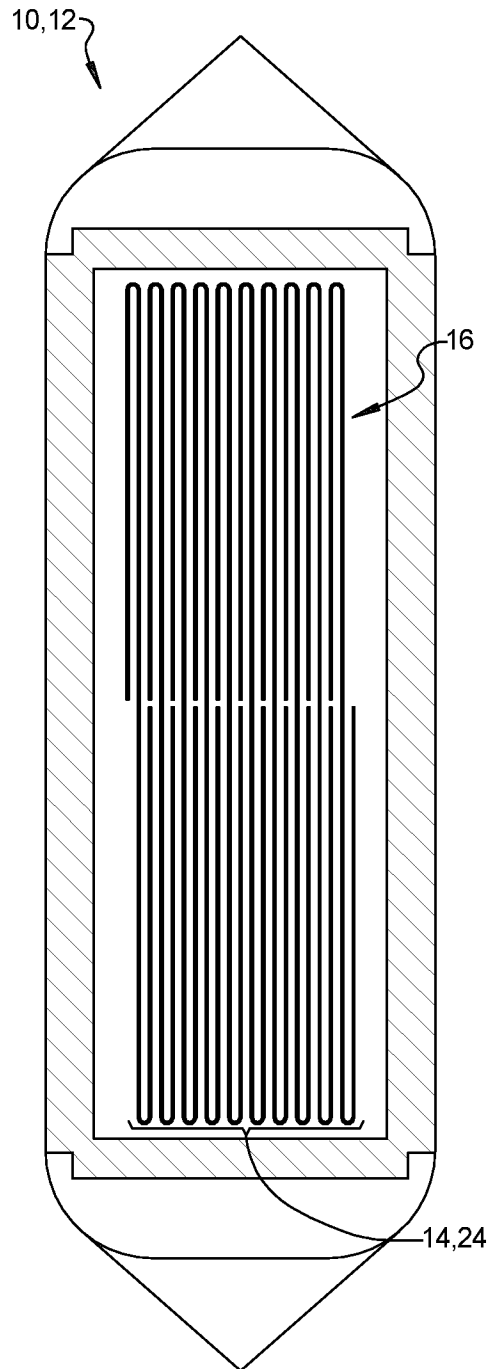


FIG. 3

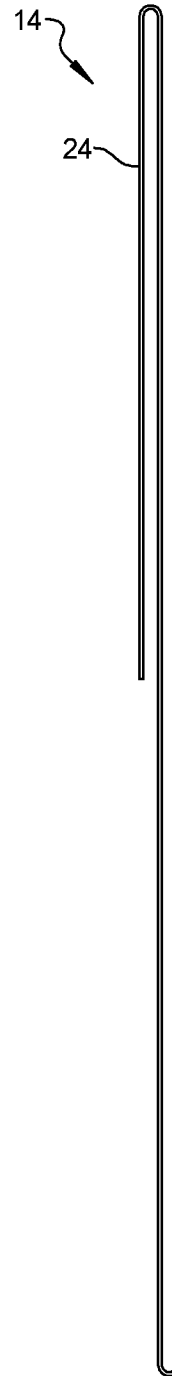
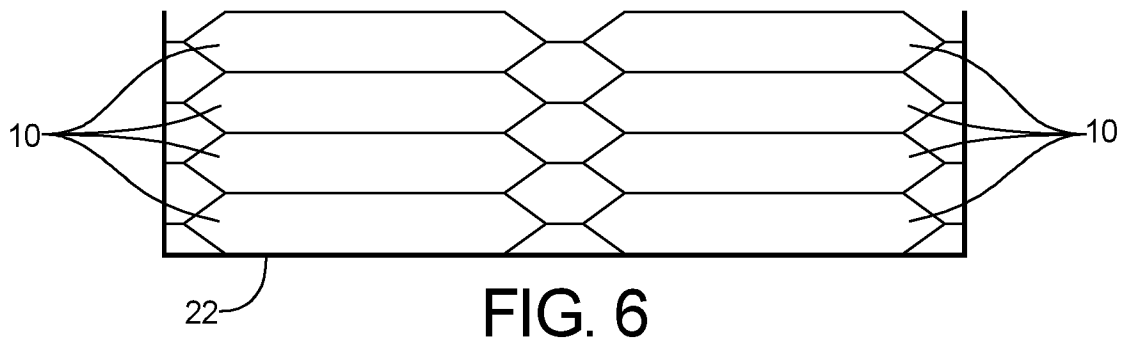
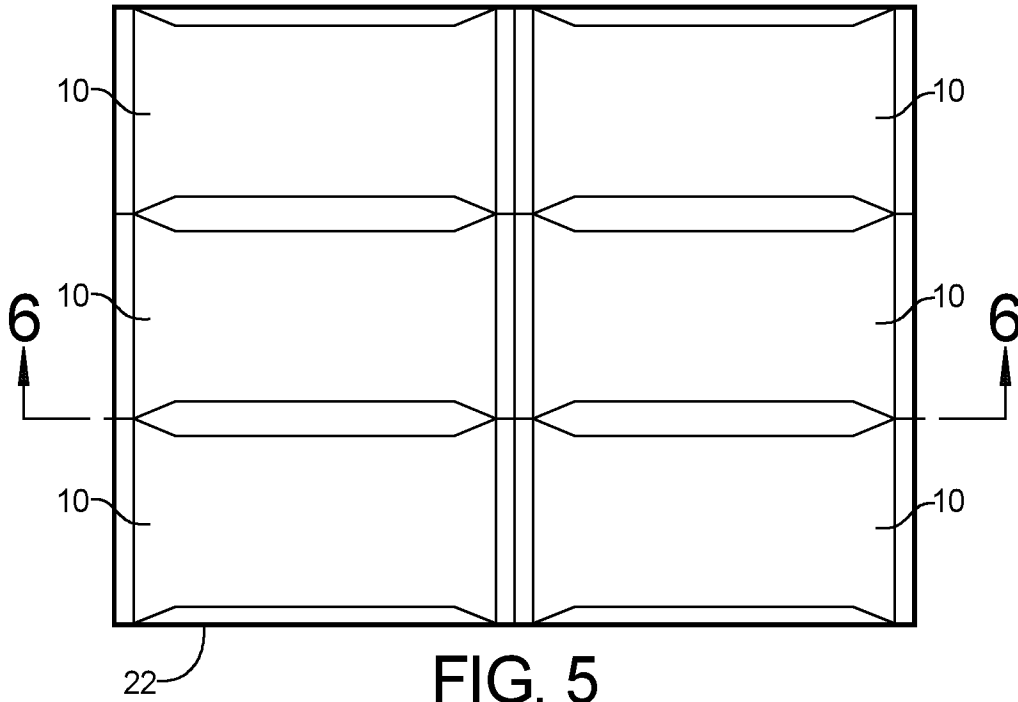
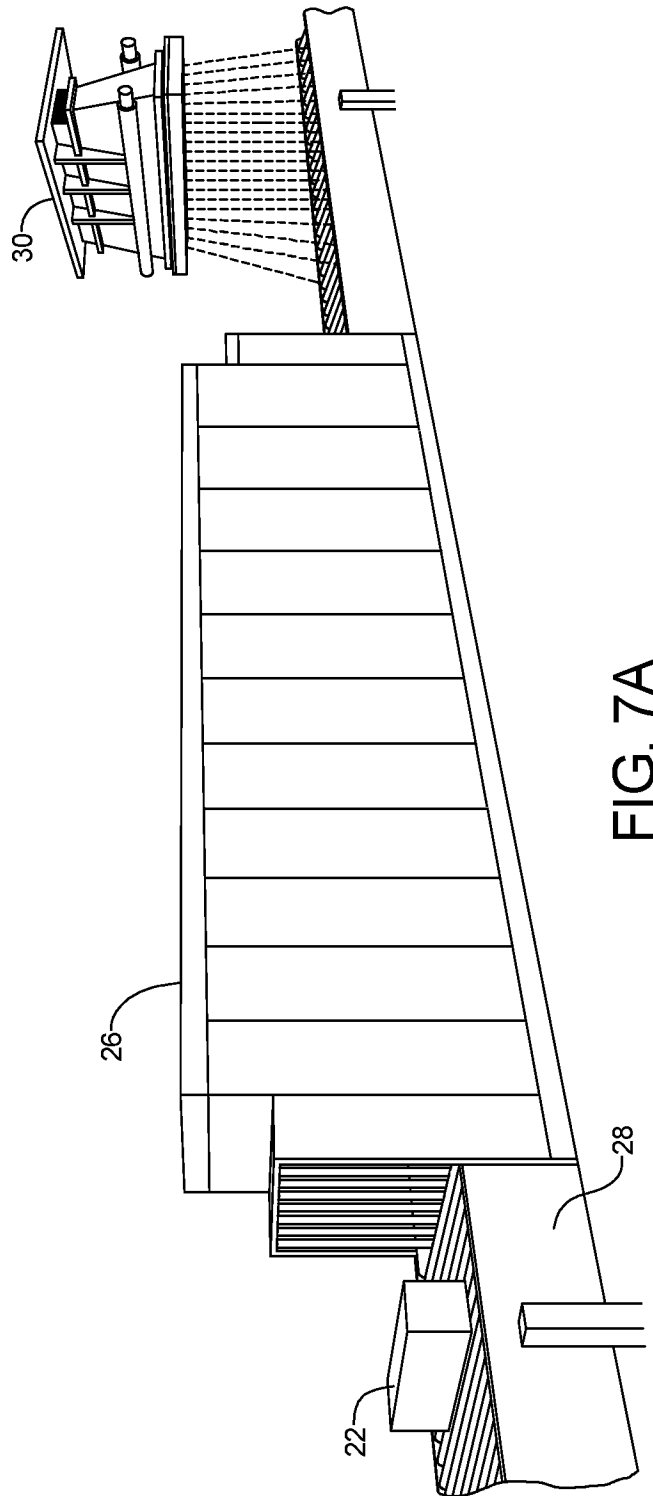
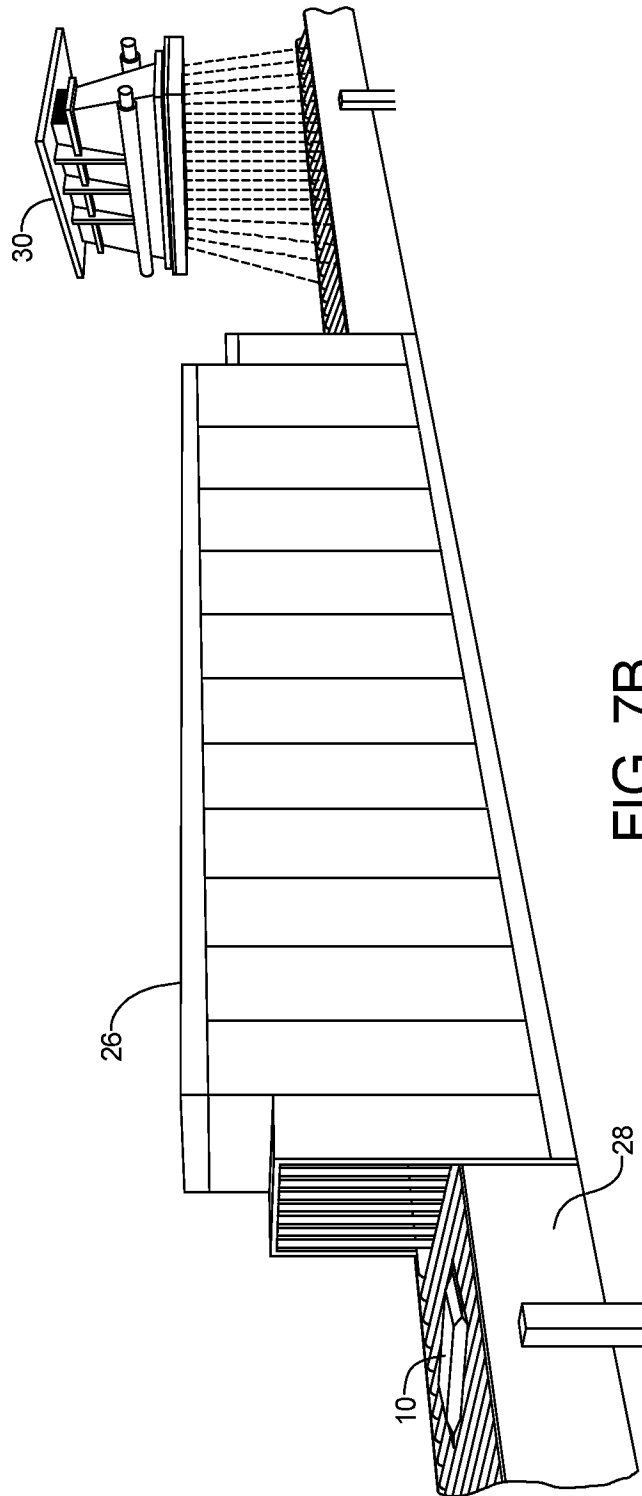


FIG. 4









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# STERILIZED CHLORHEXIDINE ARTICLE AND METHOD OF STERILIZING A CHLORHEXIDINE ARTICLE

## CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 16/231,034, filed on Dec. 21, 2018, which is a continuation of U.S. patent application Ser. No. 15/360,037, filed on Nov. 23, 2016, which claims priority to and the benefit of U.S. Patent Application No. 62/259,727, filed on Nov. 25, 2015. The entire contents of each are hereby incorporated by reference.

## BACKGROUND

The embodiments described herein relate to a sterilized chlorhexidine article and a method of sterilizing a chlorhexidine article.

Healthcare-associated infections (HAI's), which are infections contracted during the course of treatment for a medical or surgical condition, are a significant problem worldwide. HAI's are often caused by pathogenic microorganisms colonizing the patient's skin, mucous membranes, or hollow viscera. Surgery, trauma, and indwelling devices cause a breach in the body's natural barriers thereby providing a pathway for such pathogens to colonize and infect normally sterile areas of the body.

Measures to reduce colonization with pathogens have proven effective in reducing HAI's. One measure to reduce pathogens on the skin and mucous membranes is the topical application of antiseptics such as chlorhexidine. A convenient and effective means of applying chlorhexidine to the skin or mucous membranes is with the use of an applicator. For example, among their many uses, applicators may be used to apply chlorhexidine to decolonize the skin or mucous membranes of a patient or a healthcare worker prior to a surgical procedure to help prevent a surgical site infection, or they may be used on hospitalized patients with indwelling devices such as central venous catheters, urinary catheters, or endotracheal tubes to routinely decolonize the patient's skin or mucous membranes to help prevent self-infection.

It has been a challenge to develop a chlorhexidine article, and a method of sterilizing a chlorhexidine article.

## SUMMARY

In one embodiment, a sterilized chlorhexidine product is provided. The sterilized chlorhexidine product comprises a package defining an interior volume. The sterilized chlorhexidine product further comprises a sterilized chlorhexidine article. The sterilized chlorhexidine article comprises a sterilized applicator and a sterilized antiseptic composition impregnated in the sterilized applicator. The sterilized antiseptic composition comprises a sterilized solvent. The sterilized antiseptic composition further comprises a sterilized antibacterial agent dissolved in the sterilized solvent. The sterilized applicator and the sterilized antiseptic composition are disposed in the interior volume of the package. The sterilized chlorhexidine article has a Sterility Assurance Level of from  $10^{-3}$  to  $10^{-9}$ .

The present disclosure also provides a method of sterilizing a chlorhexidine article. The method comprises providing an applicator. The method further comprises providing an antiseptic composition comprising a solvent and an

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antibacterial agent dissolved in the solvent. The method further comprises sealing the chlorhexidine article inside the package to form a chlorhexidine product. The method further comprises cooling the chlorhexidine product. The method further comprises sterilizing the chlorhexidine product to form a sterilized chlorhexidine article.

## BRIEF DESCRIPTION OF THE FIGURES

Advantages of the present invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a top view of a sterilized chlorhexidine product in accordance with one embodiment.

FIG. 2 is a side view of the sterilized chlorhexidine product of FIG. 1.

FIG. 3 is a cross-sectional view of the sterilized chlorhexidine product of FIG. 1 including a plurality of sterilized chlorhexidine articles.

FIG. 4 is an expanded view of one of the plurality of sterilized chlorhexidine articles of FIG. 3.

FIG. 5 is a top view of a shipping container containing a plurality of the sterilized chlorhexidine products of FIG. 1.

FIG. 6 is a cross-sectional view of the shipping container of FIG. 6.

FIG. 7A is a perspective view of a conveyor mechanism including a shipping container, a cooling unit, and a radiation unit.

FIG. 7B is a perspective view of the conveyor mechanism of FIG. 7A with a chlorhexidine product in place of the shipping container.

## DETAILED DESCRIPTION

In one embodiment, as shown in FIGS. 1, 2, 3, and 4, a sterilized chlorhexidine product 10 comprises a package 12 and a chlorhexidine article 14. The package 12 defines an interior volume 16. The chlorhexidine article 14 is removably disposed in the interior volume 16 of the package 12.

In some embodiments, the package 12 comprises a film 18 having sealed end portions 20 as shown in FIG. 1. The package 12 may have a rectangular geometry. Of course, it is contemplated the package 12 may have any geometrical configuration suitable for receiving the chlorhexidine article 14 such as, by way of non-limiting example, a rectangular geometry.

Referring to FIGS. 1 and 3, in the illustrated embodiment, the film 18 and the sealed end portions 20 form a hermetic seal about the interior volume 16 and the chlorhexidine articles 14 disposed therein. In this manner, the package 12 protects the chlorhexidine articles 14 from contamination because the chlorhexidine articles 14 are not exposed to the environment outside the package 12. Thus, the package 12 is particularly suitable for terminal sterilization processes such as those described in detail below. While a specific configuration of the package is described, it is contemplated that the package may be adapted based on the configuration of the chlorhexidine articles 14 disposed therein.

In some embodiments, the package may further comprise a tear seal that facilitates access to the chlorhexidine articles disposed in the package. The tear seal may be arranged on the package such that the tear seal does not compromise the hermetic seal formed by the film and the sealed end portions. In this manner, the package may hermetically seal the

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chlorhexidine articles disposed therein and also allow a patient care provider to easily access the chlorhexidine articles.

In other embodiments, the film may define an outlet for dispensing the chlorhexidine articles disposed within the package. The package may further comprise a label for the outlet. The label may be applied to an external surface of the package over the outlet. The label may have a free or non-adhered end for peeling the label to expose the outlet. Of course, it will be appreciated that when the package comprises an outlet and a label, the package may not hermetically seal the chlorhexidine articles and thus may not be suitable for terminal sterilization processes.

In certain embodiments, one or more chlorhexidine articles **14** may be disposed in the interior volume **16** of the package **12**. The number of chlorhexidine articles **14** disposed into each package **12** is not particularly limited, and may correspond to the desired dosage of antiseptic intended to be delivered to the patient. In other embodiments, a single chlorhexidine article **14** is disposed in the interior volume **16** of the package **12**. More particularly, in some embodiments, the number of chlorhexidine articles **14** disposed in the package **12** may be the same as the number of chlorhexidine articles **14** that are used for a particular task. As an example, when the particular task requires six chlorhexidine articles **14**, six chlorhexidine articles **14** may be disposed in each package. In this manner, a patient care provider will be discouraged from using either too many, or too few, chlorhexidine articles **14** for the particular task. In other embodiments, the one or more of chlorhexidine articles **14** disposed in the package may be of from 2 to 10, of from 2 to 8, of from 2 to 6, or of from 2 to 4. In one embodiment, two chlorhexidine articles **14** are disposed in each package **12**. With reference to FIG. 2, in the illustrated embodiment, ten chlorhexidine articles **14** are disposed in the package **12**. Of course, still other quantities of chlorhexidine articles **14** may be disposed in each package **12**. It should be appreciated that in other instances, the chlorhexidine articles **14** are not disposed within the interior volume **16** of the package **12**, but may be prevented from exposure to the external environment through other means.

With reference to FIGS. 5 and 6, in some embodiments, a one or more of chlorhexidine products **10** may be disposed in a shipping container **22**, such as a cardboard box **22**. The number of chlorhexidine products **10** disposed in the shipping container **22** is advantageously selected based on the type of sterilizing process to be applied. For example, the shipping container may comprise of from 5 to 50 chlorhexidine products **10**. In other embodiments, the shipping container **22** may comprise fewer than twenty sterilized chlorhexidine products **10** to permit sterilization of all chlorhexidine articles **14** disposed therein. In still other embodiments, the shipping container may comprise of from 40 to 150 sterilized chlorhexidine products **10**. Of course, still other quantities of sterilized chlorhexidine products **10** may be disposed in the shipping container **22**.

It should be appreciated that the present disclosure describes a method of sterilizing a chlorhexidine product to form a sterilized chlorhexidine article. As such, throughout this disclosure, description that accompanies the terms the chlorhexidine article, or components and compositions thereof, may be referred to as the 'sterilized' component or composition upon being exposed to suitable processing where such sterility can be validated. By way of non-limiting example, the sterility of the chlorhexidine article may be validated in accordance with ISO 11137.

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In certain embodiments, the sterilized chlorhexidine article is intended to be used by a patient care provider for disinfecting skin or mucous membranes of a patient, such as disinfecting skin or mucous membranes of the patient prior to surgery or to routinely disinfect the skin during hospitalization. Alternatively, the sterilized chlorhexidine article may be used to maintain hygiene of a patient, particularly a patient unable to shower or bathe.

With reference to FIG. 4, the chlorhexidine article **14** comprises an applicator **24** and an antiseptic composition. The applicator **24** facilitates topical application of the antiseptic composition to the skin or mucous membranes of a patient. As such, the applicator **24** may take any form suitable for topically applying the antiseptic composition to the skin or mucous membranes of a patient. Characteristics that may be considered when determining whether an applicator **24** is suitable include, by way of non-limiting example, porosity, absorbency, skin or mucous membrane contactable surface area, biocompatibility, ability of the applicator to retain the antiseptic composition, cost of production, etc. By way of non-limiting example, suitable examples of the applicator **24** include a cloth, a foam, a brush, a squirt bottle, a roller, etc.

In certain embodiments, the applicator **24** may be suitable for impregnation with the antiseptic composition such that the antiseptic composition remains dispersed in the applicator until the chlorhexidine article **14** is applied to the skin or mucous membranes of a patient. In this manner, the antiseptic composition of the chlorhexidine article **14** remains impregnated in and retained by the applicator **24** when the chlorhexidine article **14** is disposed within the package **12**. When the applicator **24** is applied to the skin or mucous membranes of the patient, the antiseptic composition is transferred from the applicator **24** to the skin or mucous membranes of the patient.

In some embodiments, the applicator may further comprise a receptacle for receiving the antiseptic composition. When the applicator comprises a receptacle, the antiseptic composition may be received in the receptacle. The antiseptic composition received in the receptacle may be subsequently impregnated in the applicator by a patient care provider when the chlorhexidine article is being used to disinfect the skin or mucous membranes of a patient. In this manner, the antiseptic composition does not need to be impregnated in and retained by the applicator prior to disposing the chlorhexidine article in the package. In such embodiments, a barrier may be positioned between the applicator and the receptacle that may be compromised upon activation by the patient care provider.

With reference to FIG. 4, in one embodiment, the applicator **24** may comprise a cloth **24**. The cloth **24** may be woven, knitted, non-woven, velour, felt, flocked, needle-punched, tufted, stitch bonded, fusion-bonded, or combinations thereof. Of course, still other types of cloth are contemplated. The cloth **24** may have any weight suitable for applying the antiseptic composition to the skin or mucous membranes of the patient such as, by way of non-limiting example, of from 3.0 to 7.0, of from 4.0 to 6.0, or of from 4.5 to 5.5, ounce per square yard. The cloth **24** may have a tensile strength suitable for applying the antiseptic composition such as, by way of non-limiting example, at least 15, at least 20, or at least 25, pounds per inch in a given direction, with the given direction correlating to a machining direction of the cloth **24**. The cloth **24** may have any thickness suitable for applying the antiseptic composition to the skin or mucous membranes of a patient such as, by way of non-limiting example, of from 0.035 to 0.145, of

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from 0.45 to 0.135, of from 0.055 to 0.125, of from 0.075 to 0.115, or of from 0.085 to 0.105 inches.

In some embodiments, the cloth **24** is disposable. When the cloth **24** is disposable, the cloth **24** may be disposed of after use so as to minimize the chance of contaminating the skin or mucous membranes of a patient during re-use. Of course, in other embodiments, the cloth **24** is re-usable.

The cloth **24** may comprise a first fiber. The first fiber may be a synthetic fiber or a natural fiber. When the first fiber is a synthetic fiber, the first fiber may be selected from the group comprising polyester fiber, polypropylene fiber, polyethylene fiber, rayon fiber, nylon fiber, acrylic fiber, acetate fiber, spandex fiber, latex fiber, Kevlar fiber, or combinations thereof. Of course still other types of synthetic fiber are contemplated such as, by way of non-limiting example, polyamide fiber, azlon fiber, modacrylic fiber, novoloid fiber, nylril fiber, saran fiber, vinal fiber, vinyon fiber, regenerated cellulose fiber, and cellulose acetate fiber. In instances where the first fiber comprises a natural fiber, the first fiber may be selected from the group comprising cotton fiber, wool fiber, silk fiber, jute fiber, and linen fiber. Of course, still other types of natural fiber are contemplated.

In some embodiments, the cloth **24** may comprise a second fiber in addition to the first fiber. The second fiber may comprise any of the materials contemplated for the first fiber. When present, the second fiber may be different from the first fiber or the same as the first fiber. For example, the first fiber may be polyester fiber and the second fiber may be polyester fiber. Alternatively, the first fiber may be polyester fiber and the second fiber may be polypropylene fiber. Of course, still other combinations of the first fiber and second fiber are contemplated. Moreover, it is contemplated that the cloth may comprise three or more fibers comprising any of the materials contemplated for the first fiber.

When present, the second fiber may be different from the first fiber or the same as the first fiber. For example, the first fiber may be polyester fiber and the second fiber may be polyester fiber. Alternatively, the first fiber may be polyester fiber and the second fiber may be polypropylene fiber. Of course, still other combinations of the first fiber and second fiber are contemplated.

In one embodiment, the first fiber has a length of from 1.0 to 3.0 inches. In another embodiment, the first fiber has a length of from 1.0 to 2.0 inches. In other embodiments, the first fiber has a length of from 0.5 to 6.0, of from 0.5 to 5.0, of from 0.5 to 4.0 or from 0.5 to 3.0, inches. In still other embodiments, the first fiber has a length of from 2.0 to 6.0, of from 3.0 to 6.0, of from 4.0 to 6.0, or of from 5.0 to 6.0, inches. In still other embodiments, the first fiber has a length of from 0.5 to 2.5, of from 0.75 to 2.25, of from 1.0 to 2.0, or of from 1.25 to 1.75, inches. Of course, still other lengths of the first fiber are contemplated.

In one embodiment, the second fiber has a length of from 2.0 to 4.0 inches. In another embodiment, the second fiber has a length of from 2.5 to 3.5 inches. In other embodiments, the second fiber has a length of from 1.0 to 5.0, of from 2.0 to 5.0, of from 3.0 to 5.0, or of from 4.0 to 5.0, inches. In still other embodiments, the second fiber has a length of from 1.0 to 4.0, 1.0 to 3.0, or of from 1.0 to 2.0 inches. In still other embodiments, the second fiber has a length of from 2.25 to 3.75, of from 2.5 to 3.5, or of from 2.75 to 3.25 inches. Of course still other lengths of the second fiber are contemplated. It will be readily appreciated that the second fiber may have the same length as the first fiber, or within any of the ranges described herein for the first fiber. Moreover, the first fiber may have a length within any of the ranges described herein for the second fiber.

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In one embodiment, the first fiber may have a denier of from 0.5 to 2.5. In another embodiment, the first fiber may have a denier 1.0 to 2.0. In other embodiments, the first fiber may have a denier of from 0.75 to 2.5, of from 1 to 2.5, of from 1.25 to 2.5, of from 1.5 to 2.5, of from 1.75 to 2.5, of from 2.0 to 2.5, or of from 2.25 to 2.5. In still other embodiments, the first fiber may have a denier of from 0.5 to 2.25, of from 0.5 to 2.0, of from 0.5 to 1.75, of from 0.5 to 1.5, of from 0.5 to 1.25, of from 0.5 to 1.0, or of from 0.5 to 0.75. In still other embodiments, the first fiber has a denier of from 0.8 to 1.5, or of from 1.0 to 1.3. Of course, still other deniers of the first fiber are contemplated.

In one embodiment, the second fiber may have a denier of from 4.5 to 5.0. In another embodiment, the second fiber may have a denier of from 4.0 to 6.0. In other embodiments, the second fiber may have a denier of from 4.25 to 6.0, of from 4.5 to 6.0, of from 4.75 to 6.0, of from 5.0 to 6.0, of from 5.25 to 6.0, of from 5.5 to 6.0, or of from 5.75 to 6.0. In still other embodiments, the second fiber may have a denier of from 4.0 to 5.75, of from 4.0 to 5.5, of from 4.0 to 5.25, of from 4.0 to 5.0, of from 4.0 to 4.75, of from 4.0 to 4.5, or of from 4.0 to 4.25. In still other embodiments, the second fiber may have a denier of from 4.0 to 5.0, or of from 4.25 to 5.0. Of course, still other deniers of the second fiber are contemplated. It will be readily appreciated that the second fiber may have the same denier as the first fiber, or within any of the ranges described herein for the first fiber. Moreover, the first fiber may have a denier within any of the ranges described herein for the second fiber.

In some embodiments, when the cloth comprises the first fiber and the second fiber, the first fiber may be included in an amount of from 40 to 99, of from 50 to 90, of from 60 to 80, or of from 65 to 75, wt. % based on the total weight of the cloth, and the second fiber may be included in an amount of from 1 to 60, of from 10 to 50, of from 20 to 40, or of from 25 to 35, wt. % based on the total weight of the cloth. In other embodiments, the first fiber and the second fiber may be included in the same amount. In still other embodiments, the first fiber and the second fiber are not included in the same amount.

In one specific embodiment, the cloth **24** comprises the first fiber and the second fiber, with the first fiber comprising polyester fiber and the second fiber comprising polyester fiber. The first fiber has a length of from 1.0 to 3.0 inches and a denier of from 1.2 to 2.0. The second fiber has a length of from 3.0 to 4.0 inches and a denier of from 4.0 to 5.0. The first fiber is included in an amount of from 60 to 80 wt. % based on the total weight of the cloth **24**. The second fiber is included in an amount of from 20 to 40 wt. % based on the total weight of the cloth **24**. The cloth **24** has a thickness of from 0.055 to 0.125. The cloth **24** has a weight of from 3.8 to 5.8 ounces per square yard. The cloth **24** has a tensile strength of at least 27 pounds per square inch in a given direction, with the given direction correlating with a machining direction of the cloth **24**.

When the applicator **24** comprises the non-woven cloth **24**, the non-woven cloth **24** may be produced using any suitable method of producing a non-woven cloth as described herein. When the non-woven cloth **24** comprises a first fiber and a second fiber, the method of making the non-woven cloth may comprise blending the first and second fiber together to form blended fibers. The method may further comprise carding the blended fibers to form carded fibers, followed by crosslapping and then needle punching of the carded fibers to form a sheet of non-woven cloth. Thus, the first fiber and the second fiber are mechanically intertwined by needle punching. The sheet of non-woven

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cloth may then be cut into individual non-woven cloths. The non-woven cloth may, by way of non-limiting example, have a length of from 5 to 15 inches and a width of from 5 to 15 inches. In some embodiments, the length of the non-woven cloth may be equal to the width of the non-woven cloth. In other embodiments, the length and the width may be different. Of course, still other methods of producing the non-woven cloth **24** are contemplated.

In some embodiments, the method of producing a non-woven cloth may further comprise folding the sheet of non-woven cloth. By way of non-limiting example, the non-woven cloth may be folded in a "z-fold" (also known as an "s-fold"), a "c-fold," or any other fold style suitable for the non-woven cloth. With reference to FIGS. 3 and 4, in the illustrated embodiment, the non-woven cloth **24** is folded in a "z-fold." Of course, it is contemplated that in some embodiments the non-woven cloth may not be folded.

As described above, the applicator may comprise foam. The foam may comprise an open-celled foam or a closed-cell foam. The foam may comprise synthetic polymers. In some embodiments, when the foam comprises synthetic polymers, the synthetic polymers may be selected from the group comprising polyurethanes, polyesters, polyalkylenes, polyols, or combinations thereof. Of course, still other synthetic polymers are contemplated. Additionally, the foam may comprise natural polymers in other embodiments.

The antiseptic composition comprises one or more antibacterial agents and one or more solvents. As such, when applied to the skin or mucous membranes of a patient, the antiseptic composition is capable of killing or inhibiting the growth of bacteria on the skin or mucous membranes of the patient. In this manner, the antiseptic composition is suitable for disinfecting the skin or mucous membranes of a patient, particularly prior to a surgical operation.

The antibacterial agent may comprise chlorhexidine. The chlorhexidine may be free base chlorhexidine or a pharmaceutically acceptable salt of chlorhexidine. When the chlorhexidine is a pharmaceutically acceptable salt of chlorhexidine, the chlorhexidine may be, chlorhexidine dihydrochloride, chlorhexidine diacetate, chlorhexidine digluconate (also known as chlorhexidine gluconate, or CHG), chlorhexidine dilactate, chlorhexidine digalactate, or combinations thereof. In certain embodiments, the antibacterial agent is CHG. The pharmaceutically acceptable salt of chlorhexidine may be selected based on the solvent of the antiseptic composition due to the solubility properties of the pharmaceutically acceptable salt of chlorhexidine. For instance, CHG is soluble in water whereas chlorhexidine diacetate is substantially insoluble in water and is therefore more suitable for non-aqueous solvents.

It will be appreciated that the antibacterial agent may comprise compounds other than chlorhexidine such as, by way of non-limiting example, aminoglycoside compounds, polyhexanide, triclosan, quaternary ammonium compounds such as cetrimide, proflavine hemisulphate, chlorocresol, chlorophene, chloroxylenol, iodine, iodophors, etc., and combinations thereof. Of course, still other antibacterial agents are contemplated. Thus, while the term 'chlorhexidine' is used as an adjective throughout this disclosure to describe the product, article and other components thereof, it should be appreciated that products/articles may be free from chlorhexidine components if other antibacterial agents are utilized.

The antibacterial agent may be included in the antiseptic composition in an amount of from 0.1 to 10 wt. % based on the total weight of the antiseptic composition. In another embodiment, the antibacterial agent may be included in an

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amount of from 1.5 to 5.0 wt. % based on the total weight of the antiseptic composition. In other embodiments, the antibacterial agent may be included in an amount from 0.5 to 10, of from 1.0 to 10, of from 1.5 to 10, of from 2.0, to 10, of from 2.5 to 10, of from 3.0 to 10, of from 3.5 to 10, of from 4.0 to 10, of from 4.5 to 10, of from 5.0 to 10, of from 5.5 to 10, of from 6.0 to 10, of from 6.5 to 10, of from 7.0 to 10, of from 7.5 to 10, of from 8.0 to 10, of from 8.5 to 10, of from 9.0 to 10, or of from 9.5 to 10 wt. % based on the total weight of the antiseptic composition. In still other embodiments, the antibacterial agent may be included in the antiseptic composition in an amount of from 0.1 to 9.5, of from 0.1 to 9.0, of from 0.1 to 8.5, of from 0.1 to 8.0, of from 0.1 to 7.5, of from 0.1 to 7.0, of from 0.1 to 6.5, of from 0.1 to 6.0, of from 0.1 to 5.5, of from 0.1 to 5.0, of from 0.1 to 4.5, of from 0.1 to 4.0, of from 0.1 to 3.5, of from 0.1 to 3.0, of from 0.1 to 2.5, of from 0.1 to 2.0, of from 0.1 to 1.5, of from 0.1 to 1.0, or of from 0.1 to 0.5, wt. % based on the total weight of the antiseptic composition. In still other embodiments, the antibacterial agent may be included in the antiseptic composition in an amount of from 0.5 to 8.0, of from 1.0 to 6.0, of from 1.5 to 5.0, of from 1.8 to 4.5, of from 1.8 to 3.5, or of from 1.8 to 2.5, wt. % based on the total weight of the antiseptic composition. The amount of antibacterial agent may vary outside of the ranges above, but is typically both whole and fractional values within these ranges. Further, it is to be appreciated that more than one antibacterial agent may be included in the antiseptic composition, in which case the total amount of all the antibacterial agents included is within the above ranges.

The solvent may comprise an aqueous solvent, a non-aqueous solvent, or combinations thereof. In certain embodiments, when the solvent comprises an aqueous solvent, the solvent may be water. The water may be distilled water, sterile water, purified water prepared in accordance with United States Pharmacopeia (USP) standards, or any other type of water that is suitable for use in antiseptic compositions.

In other embodiments, when the solvent is a non-aqueous solvent, the solvent may be an alcohol. Examples of alcohols suitable for the antiseptic composition include, by way of non-limiting example, ethanol or isopropyl alcohol. Of course, still other solvents are contemplated.

The solvent may be included in the antiseptic composition in an amount of at least 1 wt. % based on the total weight of the antiseptic composition. In another embodiment, the solvent may be included in the antiseptic composition an amount of at least 50 wt. % based on the total weight of the antiseptic composition. In other embodiments, the solvent may be included in the antiseptic composition in amount of at least 5, at least 10, at least 20, at least 30, at least 40, at least 50, at least 60, at least 70, at least 80, at least 90, at least 95, or at least 99, wt. % based on the total weight of the antiseptic composition. In still other embodiments, the solvent may be included in the antiseptic composition in an amount less than 99, less than 95, less than 90, less than 80, less than 70, less than 60, less than 50, less than 40, less than 30, less than 20, less than 10, or less than 5, wt. % based on the total weight of the antiseptic composition. In still other embodiments, the solvent is included in an amount of from 40 to 99, of from 50 to 95, of from 60 to 90, of from 65 to 85, or of from 75 to 85 wt. % based on the total weight of the antiseptic composition. The amount of solvent may vary outside of the ranges above, but is typically both whole and fractional values within these ranges. Further, it is to be appreciated that more than one solvent may be included in

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the antiseptic composition, in which case the total amount of all the solvents included is within the above ranges.

In certain embodiments, when the solvent is water, water may be included in the antiseptic composition in an amount of at least 50 wt. % based on the total weight of the antiseptic composition. In another embodiment, water may be included in the antiseptic composition in an amount of at least 60 wt. % based on the total weight of the antiseptic composition. In other embodiments, water may be included in the antiseptic composition in an amount of at least 65, at least 70, at least 75, or at least 80, wt. % based on the total weight of the antiseptic composition. In still other embodiments, water may be included in the antiseptic composition in an amount of from 50 to 99, of from 60 to 95, of from 70 to 90, of from 75 to 90, or of from 80 to 90, wt. % based on the total weight of the antiseptic composition. The amount of water may vary outside of the ranges above, but is typically both whole and fractional values within these ranges. Further, it is to be appreciated that more than one type of water may be included in the antiseptic composition, in which case the total amount of all the types of water included is within the above ranges.

In some embodiments, at least 95% of the antibacterial agent is dissolved in the solvent of the antiseptic composition. In other embodiments, at least 50, 60, 70, 80, 90, 99, wt. % of the antibacterial agent is dissolved in the solvent of the antiseptic composition. It is further contemplated that all of the antibacterial agent may be dissolved in the solvent of the antiseptic composition.

The antiseptic composition may further comprise a humectant. The humectant may be compatible for use in the antiseptic composition, particularly in view of the antibacterial agent included in the antiseptic composition. The humectant may be, by way of non-limiting example, glycerol prepared according to USP standards (USP glycerol), propylene glycol, polyethylene glycol, N-methyl pyrrolidone, N-ethyl pyrrolidone, diacetone alcohol,  $\gamma$ -butyrolactone, ethyl lactate, low molecular weight polyethylene glycol, and combinations thereof. In certain embodiments, the humectant comprises USP glycerol and propylene glycol. Of course, other types of humectants are contemplated such as, by way of non-limiting example, monosaccharides, disaccharides, castor oil and derivatives and salts thereof, vegetable oil extracts such as triglycerides, and combinations thereof. Of course, still other humectants are contemplated.

When present, the humectant may be included in the antiseptic composition in an amount less than 20 wt. % based on the total weight of the antiseptic composition. In another embodiment, the antiseptic composition is included in an amount of from 3.0 to 10 wt. % based on the total weight of the antiseptic composition. In other embodiments, the humectant is included in the antiseptic composition in an amount less than 17.5, less than 15, less than 12.5, less than 10, less than 7.5, less than 5.0, or less than 2.5, wt. % based on the total weight of the antiseptic composition. In still other embodiments, the humectant is included in an amount of at least 2.5, at least 5.0, at least 7.5, at least 10, at least 12.5, at least 15, at least 17.5, or at least 20, wt. % based on the total weight of the antiseptic composition. In still other embodiments, the humectant is included in the antiseptic composition in an amount of from 3.5 to 9.0, of from 4.0 to 8.0, of from 4.5 to 7.0, or of from 5.0 to 6.0, wt. % based on the total weight of the antiseptic composition. The amount of humectant may vary outside of the ranges above, but is typically both whole and fractional values within these ranges. Further, it is to be appreciated that more than one humectant may be included in the antiseptic composition, in

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which case the total amount of all the humectants included is within the above ranges. For example, the humectant may comprise USP glycerol in an amount of from 2.0 to 3.0 wt. % based on the total weight of the antiseptic composition and propylene glycol in an amount of from 2.5 to 3.5 wt. % based on the total weight of the antiseptic composition.

The antiseptic composition may further comprise an emollient. The emollient may be of any type that is suitable for topical application to a patient. The emollient may be, by way of non-limiting example, petroleum-based oils, petrolatum, vegetable oils, mineral oils, lanolin and derivatives thereof, glycerol esters and derivatives thereof, fatty esters, propylene glycol esters and derivatives thereof, alkoxylated carboxylic acids, aloe vera, fatty alcohols, dimethicone, alkyl methicones, alkyl dimethicones, phenyl silicones, alkyl trimethylsilanes, and combinations thereof. In certain embodiments, the emollient comprises dimethicone and aloe vera. Of course, still other emollients are contemplated.

When present, the emollient or other components of the antiseptic composition may comprise insoluble particles. In the context of this disclosure "insoluble particles" are particles that are not soluble in the solvent of the antiseptic composition. In certain embodiments, the insoluble particles have an average diameter of greater than 0.2 microns such that the antiseptic composition may not be sterilized by filtration because the insoluble particles are too large.

When present, the emollient may be included in the antiseptic composition in an amount less than 10 wt. % based on the total weight of the antiseptic composition. In another embodiment, the emollient may be included in the antiseptic composition in an amount less than 5 wt. % based on the total weight of the antiseptic composition. In other embodiments, the emollient is included in the antiseptic composition in an amount less than 2.5, less than 2.0, less than 1.5, less than 1.0, less than 0.5, less than 0.25, or less than 0.2, wt. % based on the total weight of the antiseptic composition. Alternatively, the antiseptic composition comprises an amount of emollient of from 0.01 to 1, 0.1 to 0.25, or 0.1 to 0.2, wt. % based on the total weight of the antiseptic composition. The amount of emollient may vary outside of the ranges above, but is typically both whole and fractional values within these ranges. Further, it is to be appreciated that more than one emollient may be included in the antiseptic composition, in which case the total amount of all the emollients included is within the above ranges.

The antiseptic composition may further comprise a surfactant. The surfactant may be any surfactant that is compatible with the antibacterial agent of the antiseptic composition. Depending on the antibacterial agent included in the antiseptic composition, the surfactant may be a cationic surfactant, an anionic surfactant, non-ionic surfactant, or combinations thereof. When the surfactant is a non-ionic surfactant, the non-ionic surfactant may be, by way of non-limiting example, polysorbate 20, polysorbate 40, polysorbate 60, polysorbate 80, polysorbate 120, a polyoxyethylene alkyl ether, polyoxyethylene cetyl ether, polyoxyethylene palmityl ether, polyoxyethylene oxide hexadecyl ether, polyethylene glycol cetyl ether, a sucrose ester, a partial ester of sorbitol, a monoglyceride, a diglyceride, di- and tri-esters of sucrose with fatty acid, nonylphenol ethoxylate (Igepal CO 630), nonoxynol-9 and combinations thereof. In certain embodiments, the surfactant comprises polysorbate 20 and Igepal CO 630. Of course, still other surfactants are contemplated.

When present, the surfactant may be included in the antiseptic composition in an amount less than 5.0 wt. % based on the total weight of the antiseptic composition. In

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another embodiment, the surfactant may be included in the antiseptic composition in an amount less than 2.5 wt. % based on the total weight of the antiseptic composition. In other embodiments, the surfactant may be included in the antiseptic composition in an amount less than 2.0, less than 1.5, less than 1.0, less than 0.75, less than 0.50, less than 0.25, less than 0.2, less than 0.15, or less than 0.1, wt. % based on the total weight of the antiseptic composition. Alternatively, the surfactant may be included in the antiseptic composition in an amount of from 0.01 to 2, 0.05 to 1.5, or 0.01 to 0.75, wt. % based on the antiseptic composition. The amount of surfactant may vary outside of the ranges above, but is typically both whole and fractional values within these ranges. Further, it is to be appreciated that more than one surfactant may be included in the antiseptic composition, in which case the total amount of all the surfactants included is within the above ranges.

The antiseptic composition may further comprise a pH adjuster. The pH adjuster may be any pH adjuster compatible for use in the antiseptic composition. The pH adjuster may be, by way of non-limiting example, adipic acid and derivatives thereof, glycine and derivatives thereof, citric acid and derivatives thereof, calcium hydroxide, magnesium aluminometasilicate, glucono delta lactone, or combinations thereof. In certain embodiments, the pH adjuster is glucono delta lactone. Of course, still other pH adjusters are contemplated.

When present, the pH adjuster may be included in the antiseptic composition in an amount less than 5 wt. % based on the total weight of the antiseptic composition. In another embodiment, the pH adjuster may be included in the antiseptic composition in an amount less than 2.5 wt. % based on the total weight of the antiseptic composition. In other embodiments, the pH adjuster may be included in the antiseptic composition in an amount less than 2.0, less than 1.5, less than 1.0, less than 0.75, less than 0.50, less than 0.25, less than 0.2, less than 0.15, or less than 0.1, wt. % based on the total weight of the antiseptic composition. Alternatively, the pH adjuster may be included in the antiseptic composition in an amount of from 0.01 to 2, 0.05 to 1.5, or 0.05 to 0.5, wt. % based on the antiseptic composition. The amount of pH adjuster may vary outside of the ranges above, but is typically both whole and fractional values within these ranges. Further, it is to be appreciated that more than one pH adjuster may be included in the antiseptic composition, in which case the total amount of all the pH adjusters included is within the above ranges.

The antiseptic composition may have any pH suitable for the antiseptic composition to be used to disinfect the skin or mucous membranes of a patient, particularly in view of the antibacterial agent included in the antiseptic composition. In one embodiment, the antiseptic composition may have a pH of from 4 to 6. In another other embodiment, the antiseptic composition may have a pH of from 4.2 to 5.2. In still other embodiment, the antiseptic composition may have a pH of from 4 to 8, of from 4 to 7, of from 4 to 6, or of from 4 to 5. The pH of the antiseptic composition may vary outside of the ranges above in specific embodiments, but is typically both whole and fractional values within these ranges.

The antiseptic composition may further comprise an odorant. The odorant may be any odorant suitable for use in the antiseptic composition. The odorant may be, by way of non-limiting example, perfumes, fragrances, ethereal oils, essences, scents, and combinations thereof. Of course, still other odorants are contemplated.

When present, the odorant may be included in the antiseptic composition in an amount less than 5 wt. % based on

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the total weight of the antiseptic composition. In another embodiment, the odorant may be included in the antiseptic composition in an amount less than 2.5 wt. % based on the total weight of the antiseptic composition. In other embodiments, the odorant may be included in the antiseptic composition in an amount less than 2.0, less than 1.5, less than 1.0, less than 0.75, less than 0.50, less than 0.25, less than 0.2, less than 0.15, or less than 0.1, wt. % based on the total weight of the antiseptic composition. Alternatively, the odorant may be included in the antiseptic composition in an amount of from 0.001 to 2, 0.005 to 1.5, or 0.005 to 0.5, wt. % based on the antiseptic composition. The amount of odorant may vary outside of the ranges above, but is typically both whole and fractional values within these ranges. Further, it is to be appreciated that more than one odorant may be included in the antiseptic composition, in which case the total amount of all the odorants included is within the above ranges.

The antiseptic composition may further comprise a colorant. The colorant may be any colorant suitable for use in the antiseptic composition. The colorant may be a synthetically derived colorant or a naturally derived colorant. The colorant may be, by way of non-limiting example, Brilliant Blue FCF, Fast Green FCF, indigo carmine, carmoisine lake, erythrosine, carmine lake, tartrazine, annatto, colorants produced by converting a naturally derived colorant to an aluminum or calcium salt, and combinations thereof. Of course, still other colorants are contemplated.

When present, the colorant may be included in the antiseptic composition in an amount less than 5 wt. % based on the total weight of the antiseptic composition. In another embodiment, the colorant may be included in the antiseptic composition in an amount less than 2.5 wt. % based on the total weight of the antiseptic composition. In other embodiments, the colorant may be included in the antiseptic composition in an amount less than 2.0, less than 1.5, less than 1.0, less than 0.75, less than 0.50, less than 0.25, less than 0.2, less than 0.15, or less than 0.1, wt. % based on the total weight of the antiseptic composition. Alternatively, the colorant may be included in the antiseptic composition in an amount of from 0.001 to 2, 0.005 to 1.5, or 0.005 to 0.5, wt. % based on the antiseptic composition. The amount of colorant may vary outside of the ranges above, but is typically both whole and fractional values within these ranges. Further, it is to be appreciated that more than one colorant may be included in the antiseptic composition, in which case the total amount of all the colorants included is within the above ranges.

The antiseptic composition may further comprise a stabilizer, a skin protectant, a preservative, or combinations thereof. When present, the stabilizer, the skin protectant, and/or the preservative may each be included in the antiseptic composition in amounts of less than 5 wt. % based on the total weight of the antiseptic composition. In another embodiment, the stabilizer, the skin protectant, and/or the preservative may each be included in the antiseptic composition in an amount less than 2.5 wt. % based on the total weight of the antiseptic composition. In other embodiments, the stabilizer, the skin protectant, and/or the preservative may be each included in the antiseptic composition in an amount less than 2.0, less than 1.5, less than 1.0, less than 0.75, less than 0.50, less than 0.25, less than 0.2, less than 0.15, or less than 0.1, wt. % based on the total weight of the antiseptic composition. Alternatively, the stabilizer, the skin protectant, and/or the preservative may each be included in the antiseptic composition in an amount of from 0.001 to 2, 0.01 to 1.5, or 0.01 to 0.5, wt. % based on the antiseptic



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composition. The amount of the stabilizer, the skin protectant, and/or the preservative may vary outside of the ranges above, but is typically both whole and fractional values within these ranges. Further, it is to be appreciated that more than one of the stabilizer, the skin protectant, and/or the preservative may be included in the antiseptic composition, in which case the total amount of all the stabilizers, the skin protectants, and/or the preservatives included is within the above ranges.

In one particular embodiment, the antiseptic composition includes less than 10, 5, 3, 1, 0.5, or 0.1, wt. % of an anionic compound. For configurations where the antibacterial agent comprises CHG, anionic compounds may compromise the efficacy of the antiseptic composition. As such, the selection of the components included in the antiseptic composition may account for this characteristic. For example, in embodiments where the antiseptic composition includes at least one of the humectant, the emollient, the surfactant, the pH adjuster, the odorant, the colorant, the stabilizer, the preservative, and/or the skin protectant, each of these components included may be non-ionic or cationic. In still further embodiments, the antiseptic composition may be free of an anionic compound other than the anionic compound(s) included as the antibacterial agent. In other words, no anionic compound may be included in the antiseptic composition, other than those anionic compounds of the antibacterial agent.

In some embodiments, the antiseptic composition is free of an alcohol having a boiling point less than 90° C. at 1.0 atm. By way of non-limiting example, an alcohol having a boiling point less than 90° C. at 1.0 atm may be ethanol or isopropyl alcohol. Alternatively, the antiseptic composition may include less than 5.0 wt. % alcohol having a boiling point less than 90° C. at 1.0 atm based on the total weight of the antiseptic composition. Alternatively still, the antiseptic composition includes less than 4.0 wt. %, less than 3.0 wt. %, less than 2.0 wt. %, or less than 1.0 wt. %, of alcohol having a boiling point less than 90° C. at 1.0 atm, each based on the total weight of the antiseptic composition. In these embodiments, the antiseptic composition is particularly suitable for disinfection of the skin or mucous membranes of a patient because the antiseptic composition does not dry the skin or mucous membranes of the patient. Moreover, the antiseptic composition may be applied to the skin or mucous membranes of a patient multiple times within a 24 hour period without concern for irritating the skin or mucous membranes of the patient due to dryness. However, despite the fact that an alcohol having a boiling point less than 90° C. at 1.0 atm is generally not necessary, in certain embodiments, the antiseptic composition may include an alcohol having a boiling point less than 90° C. at 1.0 atm in an amount of from 5 to 15 wt. % based on the total weight of the antiseptic composition.

The antiseptic composition may include less than 10, less than 7.5, less than 5.0, less than 2.5, less than 1.0, or less than 0.5 wt. % of an alcohol based on the total weight of the antiseptic composition wt. % of an alcohol based on the total weight of the antiseptic composition. Alternatively, the antiseptic composition includes no amount of an alcohol. In these embodiments, the antiseptic composition is particularly suitable for disinfection of the skin or mucous membranes of a patient because the antiseptic composition does not dry the skin or mucous membranes of the patient. Of course, it will be appreciated that in some embodiments, alcohol may be included in the antiseptic composition in amounts greater than 10 wt. % based on the total weight of the antiseptic composition.

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In some embodiments, the antiseptic composition is non-flammable. The antiseptic composition may be non-flammable such that the flash point of the antiseptic composition is at least 38° C., at least 60° C., or at least 93° C. In this manner, the antiseptic composition of the chlorhexidine article reduces the potential risk of fire that may be associated with other antiseptic compositions such as those that contain, for example, ethanol or isopropyl alcohol.

In one particular embodiment, the antiseptic composition comprises water in an amount of at least 50 wt. % based on the total weight of the antiseptic composition and chlorhexidine gluconate (CHG) in an amount of from 1.5 to 5.0 wt. % based on the total weight of the antiseptic composition. The CHG is dissolved in the water. In another embodiment, the antiseptic composition consists essentially of water in an amount of at least 50 wt. % based on the total weight of the antiseptic composition, chlorhexidine gluconate (CHG) in an amount of from 1.5 to 5.0 wt. % based on the total weight of the antiseptic composition, a humectant in an amount of from 3.0 to 10 wt. % based on the total weight of the antiseptic composition, an emollient in an amount less than 1.0 wt. % based on the total weight of the antiseptic composition, and optionally additives selected from the group consisting of a solvent, an antibacterial agent, a humectant, an emollient, a surfactant, a pH adjuster, an odorant, a colorant, or combinations thereof.

In various embodiments, the antiseptic composition is, comprises, or consists essentially of an antibacterial agent and a solvent. For example, in embodiments that "consist essentially of" the aforementioned components, the antiseptic composition may be free of the humectant, the emollient, the surfactant, the pH adjuster, the odorant, the colorant, the stabilizer, the skin protectant, the preservative, and/or combinations thereof. Alternatively, any one or more of these components may be included in an amount less than 25, 20, 15, 10, 5, 4, 3, 2, 1, 0.1, 0.05, 0.01, etc., wt. % or any range thereof, based on a total weight of the antiseptic composition. In various non-limiting embodiments, all values and ranges of values between the aforementioned values are hereby expressly contemplated.

It should be appreciated that the ranges provided above for each of the components of the antiseptic compositions may refer to the amounts of those components in the sterilized antiseptic compositions or the unsterilized antiseptic compositions. Because certain sterilization processes may cause certain components to degrade, the amount of each component in the antiseptic composition may vary from the non-sterile condition to the sterilized condition. As but one example, the description provided above should be understood to encompass the possibility that the sterilized antiseptic composition may comprise an amount of from 0.1 to 5 wt. % of the antibacterial agent, or alternatively, that the unsterilized antiseptic composition may comprise an amount of from 0.1 to 5 wt. % of the antibacterial agent.

Referring again to FIG. 4, in certain embodiments, the antiseptic composition is impregnated in the applicator 24. In some embodiments, when the antiseptic composition is impregnated in the applicator 24, the antiseptic composition may be dispersed evenly in the applicator 24 such that the concentration of the antiseptic composition is substantially the same (+/-1, 3, 5, or 10 wt. %) at all regions of the applicator 24. In other embodiments, the antiseptic composition may be impregnated in the applicator 24 such that a region of the applicator 24 may have a greater concentration of the antiseptic composition than another region. By way of non-limiting example, the antiseptic composition may be impregnated in the applicator 24 such that the concentration

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of the antiseptic composition is greater at a surface of the applicator **24** than beneath the surface of the applicator, or vice-versa.

As will be described in further detail below, in some embodiments, when the antiseptic composition is impregnated in the applicator **24**, the antiseptic composition may be impregnated in the applicator **24** an amount of from 0.1 to 100 g per applicator. In another embodiment, the antiseptic composition may be impregnated in the applicator **24** in an amount of from 15 to 40 g per applicator. In other embodiments, the antiseptic composition may be impregnated in the applicator **24** in an amount of from 0.1 to 90, of from 0.1 to 80, of from 0.1 to 70, of from 0.1 to 60, of from 0.1 to 50, of from 0.1 to 40, of from 0.1 to 30, of from 0.1 to 20, of from 0.1 to 10, of from 0.1 to 5, or of from 0.1 to 2.5, g. In still other embodiments, the antiseptic composition may be impregnated in the applicator **24** in an amount of from 2.5 to 100, of from 5 to 100, of from 10 to 100, of from 20 to 100, of from 30 to 100, of from 40 to 100, of from 50 to 100, of from 60 to 100, of from 70 to 100, of from 80 to 100, of from 90 to 100, g. In still other embodiments, the antiseptic composition may be impregnated in the applicator **24** in an amount of from 5 to 50 g, of from 10 to 40, of from 15 to 30, or of from 22.5 to 27.5, g.

In some embodiments, the antiseptic composition may be impregnated in the applicator **24** in an amount of from 0.1 to 100 mL per applicator. In another embodiment, the antiseptic composition may be impregnated in the applicator **24** in an amount of from 15 to 40 mL per applicator. In other embodiments, the antiseptic composition may be impregnated in the applicator **24** in an amount of from 0.1 to 90, of from 0.1 to 80, of from 0.1 to 70, of from 0.1 to 60, of from 0.1 to 50, of from 0.1 to 40, of from 0.1 to 30, of from 0.1 to 20, of from 0.1 to 10, of from 0.1 to 5, or of from 0.1 to 2.5, mL. In still other embodiments, the antiseptic composition may be impregnated in the applicator **24** in an amount of from 2.5 to 100, of from 5 to 100, of from 10 to 100, of from 20 to 100, of from 30 to 100, of from 40 to 100, of from 50 to 100, of from 60 to 100, of from 70 to 100, of from 80 to 100, of from 90 to 100, mL. In still other embodiments, the antiseptic composition may be impregnated in the applicator **24** in an amount of from 5 to 50 g, of from 10 to 40, of from 15 to 30, or of from 22.5 to 27.5, mL.

The antiseptic composition may be impregnated in the applicator **24** in an amount such that the concentration of the antibacterial agent is therapeutically effective in each applicator. In one embodiment, the antiseptic composition is impregnated in the applicator **24** such that antibacterial agent is included in an amount of from 50 to 1000 mg per applicator **24**. In other embodiments, the antiseptic composition is impregnated in the applicator **24** such that antibacterial agent is included in an amount of from 100 to 900, 200 to 800, 300 to 700, 400 to 600, or 450 to 550, mg per applicator **24**. In certain embodiments, when CHG is the antibacterial agent, the antiseptic composition may be impregnated in the applicator **24** such that CHG is included in an amount of from 400 to 600 mg per applicator **24**.

In instances where the applicator is not impregnated, but rather includes a receptacle for retaining the antiseptic composition before activation by the caregiver, each receptacle may comprise the antiseptic composition in an amount of from 0.1 to 100, 15 to 40, 0.1 to 90, 0.1 to 80, 0.1 to 70, 0.1 to 60, 0.1 to 50, 0.1 to 40, 0.1 to 30, 0.1 to 20, 0.1 to 10, 0.1 to 5, 0.1 to 2.5, g per receptacle. The antiseptic composition may be included in the receptacle such that the

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antibacterial agent is included in an amount of from 100 to 900, 200 to 800, 300 to 700, 400 to 600, or 450 to 550, mg per receptacle.

In some embodiments, the chlorhexidine product may further comprise an insert. The insert may be disposed in the package to support the chlorhexidine article and insulate the chlorhexidine article. As an example, the insert may insulate the chlorhexidine article disposed in the package during heating of the chlorhexidine article prior to application of the chlorhexidine article to the skin or mucous membranes of a patient. Furthermore, the insert may be used to support the applicator when the applicator is impregnated with the antiseptic composition. In this manner, the insert may ensure the applicator does not become contaminated during impregnation of the antiseptic composition.

As will be described below, the chlorhexidine article **14** undergoes a sterilization process, such as a terminal sterilization process, to form a sterilized chlorhexidine article **14**. The chlorhexidine article **14** may be subjected to any sterilization process suitable to sterilize the chlorhexidine article **14** such that the sterility of the chlorhexidine article **14** can be validated. For example, the chlorhexidine article **14** may be subjected to heat sterilization, radiation sterilization, ethylene oxide gas sterilization, or combinations thereof.

In the context of this disclosure, when the chlorhexidine article **14** is sterilized, the components of the chlorhexidine article **14** are in a sterile condition, and that sterile condition has been validated, the resultant article is referred to as a sterilized chlorhexidine article **14**. Accordingly, when the chlorhexidine article **14** is in the sterile condition, the applicator **24**, the antiseptic composition, and components thereof, are referred to as a 'sterilized' applicator **24** and a 'sterilized' antiseptic composition, etc.

The sterile condition of the chlorhexidine article **14**, or components thereof, may be defined as sterile in accordance with one or more ISO standards. By way of non-limiting example, the sterilized chlorhexidine article **14** may be sterile in accordance with ISO 20857, ISO 17665, ISO 11135, and/or ISO 11137. In some embodiments, the sterilized chlorhexidine article **14** may be sterile in accordance with ISO 11137.

When the chlorhexidine article **14**, or components thereof, is exposed to a sterilization process, the sterilized chlorhexidine article **14**, or components thereof, has a Sterility Assurance Level (SAL) equal to or less than  $10^{-3}$ . In the context of this disclosure, "SAL" means the probability of a chlorhexidine article **14** being in a non-sterile condition after the chlorhexidine article **14** has been subjected to a sterilization process (and remains in the package **12** free from further external contamination).

In one aspect, the sterilization process may be understood as a step or sequence of steps that are sufficient to give the chlorhexidine article **14** a SAL equal to or less than  $10^{-3}$ . In certain embodiments, the sterilized chlorhexidine article **14** has a SAL equal to or less than  $10^{-6}$ . In other embodiments, the sterilized chlorhexidine article **14** has a SAL of from  $10^{-3}$  to  $10^{-12}$ , of from  $10^{-3}$  to  $10^{-9}$ , or of from  $10^{-3}$  to  $10^{-6}$ . In still other embodiments, the sterilized chlorhexidine article **14** has a SAL of from  $10^{-6}$  to  $10^{-12}$ , or of from  $10^{-9}$  to  $10^{-12}$ . In still other embodiments, the sterilized chlorhexidine article **14** has a SAL of less than  $10^{-9}$ , or less than  $10^{-12}$ . In some embodiments, the chlorhexidine article **14** has a SAL of from  $10^{-3}$  to  $10^{-9}$ . As described above, the components of the sterilized chlorhexidine article **14** may also have a SAL corresponding to the SAL of the sterilized chlorhexidine article **14**. For example, the sterilized water,

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the sterilized applicator **24**, and the other components of the sterilized article may have a SAL of from  $10^{-3}$  to  $10^{-12}$ , of from  $10^{-3}$  to  $10^{-9}$ , or of from  $10^{-3}$  to  $10^{-6}$ .

In one embodiment, when the chlorhexidine product **10** is subjected to a sterilization process, such as a terminal sterilization process, it will be appreciated that the package **12** is also subjected to the sterilization process in addition to the chlorhexidine article **14** disposed therein. However, as the external surface of the package **12** is exposed to the environment during subsequent handling (post-sterilizing), the external surface of the package **12** may not remain sterile even though the sterilized chlorhexidine article **14** does remain in the sterile condition. Despite the fact that the external surface of the package **12** may not remain sterile, the interior volume **16** of the package **12** remains sterile at least until the package **12** is opened. In the context of this disclosure, the term package **12** is used to refer to both a sterilized package **12** and a non-sterilized package **12**.

When the chlorhexidine article is sterilized, the sterilized antiseptic composition may further comprise degradation impurities. The degradation impurities may be a result of exposing the chlorhexidine article to the sterilization process. When the sterilization process is heat sterilization, or radiation sterilization, and the antibacterial agent comprises CHG, the degradation impurities may include, by way of non-limiting example, N-[[6-[[[(4-chlorophenyl)carbamimidoyl]carbamimidoyl]-amino]hexyl]carbamimidoyl]urea, N-(4-chlorophenyl)guanidine, N-(4-chlorophenyl)urea, 1-(6-aminohexyl)-5-(4-chlorophenyl)biguanide, N-(4-chlorophenyl)-N'-[[6-[[[(4-chlorophenyl)carbamimidoyl]carbamimidoyl]amino]hexyl]carbamimidoyl]urea, 1-(4-chlorophenyl)-5-[6-[[[(phenyl)carbamimidoyl]carbamimidoyl]amino]hexyl]biguanide, 1-[6-(carbamimidoylamino)hexyl]-5-(4-chlorophenyl)-biguanide, p-chloroaniline, and combinations thereof. Of course still other degradation impurities of CHG are contemplated. Furthermore, degradation impurities for antibacterial agents other than CHG are also contemplated.

In one embodiment, the sterilized antiseptic composition is free from degradation impurities with a concentration having a toxicity unacceptable for topical skin applications according to ICH Q3. In one aspect, the sterilized antiseptic composition comprises less than 1, less than 0.1, less than 0.01, or less than 0.001 of a toxic degradation impurity.

When present, the degradation impurities may be included in the sterilized antiseptic composition in an amount less than 2.0 wt. % based on the total weight of the sterilized antiseptic composition. In another embodiment, the degradation impurities may be included in the sterilized antiseptic composition in an amount less than 5.0 wt. % based on the total weight of the sterilized antiseptic composition. In other embodiments, the degradation impurities may be included in the sterilized antiseptic composition in an amount less than 1.75, less than 1.5, less than 1.25, less than 1.0, less than 0.75, less than 0.5, less than 0.25, less than 0.2, less than 0.1, less than 0.05, less than 0.01, or less than 0.001 wt. % based on the total weight of the sterilized antiseptic composition. In still other embodiments, the degradation impurities may be included in the sterilized antiseptic composition in an amount of from 0.001 to 0.01, of from 0.001 to 0.1, of from 0.001 to 0.2, of from 0.001 to 0.25, of from 0.001 to 0.5, of from 0.001 to 0.75, of from 0.001 to 1.0, of from 0.001 to 1.25, of from 0.001 to 1.5, of from 0.001 to 1.75, or of from 0.001 to 2.0, wt. % based on the total weight of the sterilized antiseptic composition. The amount of degradation impurities may vary outside of the ranges above, but is typically both whole and fractional

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values within these ranges. Further, it is to be appreciated that more than one degradation impurity may be included in the antiseptic composition, in which case the total amount of all the degradation impurities included is within the above ranges.

The present disclosure also provides a method of sterilizing a chlorhexidine article.

The method of sterilizing the chlorhexidine article **14** comprises providing the applicator and providing the antiseptic composition. In some embodiments, providing the antiseptic composition may further comprise providing the solvent, providing the antibacterial agent, and combining the solvent and the antibacterial agent to form the antiseptic composition. In other embodiments, providing the antiseptic composition may further comprise providing the solvent, providing the antibacterial agent, providing at least one of the humectant, the emollient, the surfactant, the pH adjuster, the odorant, the colorant, the stabilizer, the skin protectant, or the preservative, and combining the solvent, the antibacterial agent, and the at least one of the humectant, the emollient, the surfactant, the pH adjuster, the odorant, the colorant, the stabilizer, the skin protectant, or the preservative, to form the antiseptic composition. It is contemplated that when at least one of the humectant, the emollient, the surfactant, the pH adjuster, the odorant, the colorant, the stabilizer, the skin protectant, or the preservative is provided, the solvent and the at least one of the humectant, the emollient, the surfactant, the pH adjuster, the odorant, the colorant, the stabilizer, the skin protectant, or the preservative may be combined first followed by combining the antibacterial agent, or in any other suitable order of addition. In some embodiments, the antibacterial agent may be combined with a portion of the solvent to form an antibacterial agent concentrate. By way of non-limiting example, the antibacterial agent concentrate may be 20 wt. % CHG dissolved in water. When the antibacterial agent concentrate is formed, the antibacterial agent concentrate may be combined with the solvent, or the solvent and at least one of the humectant, the emollient, the surfactant, the pH adjuster, the odorant, the colorant, the stabilizer, the skin protectant, or the preservative, to form the antiseptic composition.

The method may further comprise impregnating the antiseptic composition in the applicator **24** to form the chlorhexidine article **14**. The antiseptic composition may be impregnated in the applicator **24** in any amount described herein to form the chlorhexidine article **14**. Impregnating may be performed by spraying the antiseptic composition on the applicator on one or multiple sides. The amount of antiseptic composition that is impregnated may be appropriately metered to ensure that the proper amount is provided in each applicator. As described above, the applicator **24** may be support by an insert during impregnation to ensure applicator does not become contaminated during impregnation. Alternatively, when the applicator comprises the receptacle for receiving the antiseptic composition, the method of sterilizing the chlorhexidine article may comprise filling the receptacle of the applicator with the antiseptic composition to form the chlorhexidine article.

Once the antiseptic composition has been impregnated in the applicator **24**, the chlorhexidine article **14** can be encompassed in the package **12**. In one possible embodiment, the package **12** is wrapped around the chlorhexidine article **14** and prepared for sealing. However, it should be appreciated that other ways of encompassing the chlorhexidine article **14** in the package **12** may also be used.

The method further comprises sealing the chlorhexidine article **14** inside the package **12** to form the chlorhexidine

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product 10. The chlorhexidine article 14 may be sealed inside the package 12 such that the chlorhexidine article 14 is hermetically sealed inside the package 12. The chlorhexidine article 14 may be sealed inside the package 12 in any suitable manner such as, by way of non-limiting example, heat sealing. Of course, other methods of sealing the chlorhexidine article 14 inside the package 12 are contemplated. In some embodiments, the method of sterilizing the chlorhexidine article 14 may further comprise disposing the chlorhexidine article 14 within the interior volume 16 of the package 12 prior to sealing the chlorhexidine article 14 inside the package 12. In other embodiments, the method of sterilizing the chlorhexidine article 14 may further comprise disposing the package 12 about the chlorhexidine article 14 prior to sealing the chlorhexidine article 14 inside the package 12. In another embodiment, sealing the chlorhexidine article 14 inside the package 12 may comprise shrink wrapping the chlorhexidine article 14.

The method may further comprise cooling the chlorhexidine product 10. Because the chlorhexidine article 14 is disposed within the interior volume 16 of the package 12 at this point, the step of cooling may be further understood to include the step of cooling the chlorhexidine article 14 and components thereof, including but not limited to, the solvent, the antibacterial agent, etc. Cooling the chlorhexidine product 10 may further comprise cooling the chlorhexidine product 10 such that at least a portion of the solvent of the antiseptic composition undergoes a phase change from a liquid state to a solid state.

Cooling the chlorhexidine product 10 may comprise cooling the chlorhexidine product 10 to a temperature of from  $-100^{\circ}\text{C}$ . to  $20^{\circ}\text{C}$ . In one embodiment, the chlorhexidine product 10 may be cooled to a temperature of from  $-30^{\circ}\text{C}$ . to  $3^{\circ}\text{C}$ . In another embodiment, the chlorhexidine product 10 may be cooled to a temperature of from  $-80^{\circ}\text{C}$ . to  $5^{\circ}\text{C}$ . In other embodiments, the chlorhexidine product 10 may be cooled to a temperature of from  $-90^{\circ}\text{C}$ . to  $20^{\circ}\text{C}$ ., of from  $-80^{\circ}\text{C}$ . to  $20^{\circ}\text{C}$ ., of from  $-70^{\circ}\text{C}$ . to  $20^{\circ}\text{C}$ ., of from  $-60^{\circ}\text{C}$ . to  $20^{\circ}\text{C}$ ., of from  $-50^{\circ}\text{C}$ . to  $20^{\circ}\text{C}$ ., of from  $-40^{\circ}\text{C}$ . to  $20^{\circ}\text{C}$ ., or of from  $-30^{\circ}\text{C}$ . to  $20^{\circ}\text{C}$ . In certain embodiments, the chlorhexidine product 10 may be cooled to a temperature equal to or less than the freezing point of the solvent in the antiseptic composition. By way of non-limiting example, if the solvent comprises water, the chlorhexidine product 10 may be cooled to a temperature equal to or less than  $0^{\circ}\text{C}$ . Other suitable solvents and melting points are contemplated such as, by way of non-limiting example, ethanol ( $-114^{\circ}\text{C}$ .), or isopropyl alcohol ( $-89^{\circ}\text{C}$ .). When the solvent comprises more than one solvent, the chlorhexidine product 10 may be cooled to a temperature equal to or less than the melting point of the one of the solvents in the antiseptic composition. In still other embodiments, the chlorhexidine product 10 may be cooled to a temperature of from  $-40^{\circ}\text{C}$ . to  $10^{\circ}\text{C}$ ., of from  $-35^{\circ}\text{C}$ . to  $5^{\circ}\text{C}$ ., of from  $-30^{\circ}\text{C}$ . to  $0^{\circ}\text{C}$ ., or of from  $-25^{\circ}\text{C}$ . to  $10^{\circ}\text{C}$ . In still other embodiments, the chlorhexidine product 10 may be cooled to a temperature of from  $-40^{\circ}\text{C}$ . to  $5^{\circ}\text{C}$ ., of from  $-40^{\circ}\text{C}$ . to  $0^{\circ}\text{C}$ ., of from  $-40^{\circ}\text{C}$ . to  $-5^{\circ}\text{C}$ ., of from  $-40^{\circ}\text{C}$ . to  $-10^{\circ}\text{C}$ ., of from  $-40^{\circ}\text{C}$ . to  $-15^{\circ}\text{C}$ ., or of from  $-25^{\circ}\text{C}$ . to  $-15^{\circ}\text{C}$ . Of course, still other temperatures are contemplated.

In one aspect, cooling the chlorhexidine product 10 may comprise cooling the chlorhexidine product 10 such that at least 50 wt. % of the solvent of the antiseptic composition undergoes a phase change from a liquid state to a solid state. In another embodiment, cooling the chlorhexidine product 10 may comprise cooling the chlorhexidine product 10 such that at least 0.1 wt. % of the solvent of the antiseptic

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composition undergoes a phase change from a liquid state to a solid state. In other embodiments, cooling the chlorhexidine product 10 may comprise cooling the chlorhexidine product 10 such that at least 1, at least 5, at least 10, at least 15, at least 20, at least 30, at least 40, at least 50, at least 60, at least 70, at least 80, at least 90, at least 95, or at least 99, wt. % of the solvent undergoes a phase change from a liquid state to a solid state. In certain embodiments, cooling the chlorhexidine product 10 may comprise cooling the chlorhexidine product 10 such that all of the solvent undergoes a phase change from a liquid state to a solid state. Alternatively, cooling the chlorhexidine product 10 may comprise cooling the chlorhexidine product 10 such that none of the solvent undergoes a phase change from a liquid state to a solid state. In still other embodiments, cooling the chlorhexidine product 10 may comprise cooling the chlorhexidine product 10 such that less than 99, less than 95, less than 90, less than 80, less than 70, less than 60, less than 50, less than 40, less than 30, less than 20, less than 10, less than 5, or less than 1, wt. % of the solvent undergoes a phase change from a liquid state to a solid state.

The cooling of the chlorhexidine product 10 may be performed at atmospheric pressure. By way of non-limiting example, the cooling of the chlorhexidine product 10 may be performed at a pressure of at least 1 atm. In other embodiments, the cooling of the chlorhexidine product 10 may be performed at a pressure of from 0.8 to 1.2, of from 0.9 to 1.1, or of from 0.95 to 1.05, atm. Furthermore, once the cooling of the chlorhexidine product 10 is complete the chlorhexidine product 10 may not be exposed to pressures below atmospheric pressure. By way of non-limiting example, after cooling the chlorhexidine product 10 the chlorhexidine product 10 may not be exposed to pressures less than 0.95, less than 0.9, less than 0.8, or less than 0.5, atm. In this manner, the chlorhexidine product 10 is not subjected to lyophilization (also known as freeze-drying).

With continued respect to cooling the chlorhexidine product 10, when a plurality of chlorhexidine articles 14 are included in the package 12, cooling the chlorhexidine product 10 may further comprise cooling the chlorhexidine product 10 such that at least a portion of the solvent in the antiseptic composition of each chlorhexidine article 14 undergoes a phase change from a liquid state to a solid state. In another embodiment, when a plurality of chlorhexidine products 10 are disposed in the shipping container 22, cooling the chlorhexidine product 10 may further comprise cooling the shipping container 22 such that at least a portion of the solvent in the antiseptic composition of each chlorhexidine article 14 in each package 12 undergoes a phase change from a liquid state to a solid state.

With continued respect to cooling the chlorhexidine product 10, the chlorhexidine product 10 may be cooled by any suitable cooling unit 26. By way of non-limiting example, the cooling unit 26 may be a freezer, a refrigerator, a walk-in freezer, a walk-in cooler, a tunnel blast freezer, or a refrigerated warehouse. Alternatively, the cooling unit 26 may dispense liquid refrigerant such as by way of non-limiting example, liquid nitrogen, liquid nitrous oxide, or liquid carbon dioxide. With reference to FIG. 7A, in one embodiment, the cooling unit 26 is a tunnel blast freezer 26. The tunnel blast freezer 26 may be arranged about a conveyor mechanism 28 to facilitate efficient cooling of the shipping container 22 and the plurality of chlorhexidine products 10 disposed therein. Likewise, as shown in FIG. 7B, the conveyor mechanism may be used to efficiently cool single chlorhexidine products 10 instead of the plurality of chlorhexidine products 10 disposed in the shipping container 22.

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In other embodiments, a plurality of shipping containers and the chlorhexidine products **10** disposed therein may be cooled in a freezer, or a walk-in freezer.

The method further comprises sterilizing the chlorhexidine product **10** to form the sterilized chlorhexidine article **14**. The chlorhexidine product **10** may be sterilized by any sterilization process such that the sterility of the chlorhexidine article **14** can be verified. In some embodiments, sterilizing the chlorhexidine product **10** comprises irradiating the chlorhexidine product **10** to form a sterilized chlorhexidine article **14**.

In other embodiments, sterilizing the chlorhexidine product **10** further comprises heat sterilizing the chlorhexidine product **10**. Of course it should be appreciated that the antibacterial agent of the antiseptic composition may not be compatible with heat sterilization. For example, heat sterilization is known to be unsuitable for antiseptic compositions comprising CHG in an amount of greater than 1.0 wt. % based on the total weight of the antiseptic composition because of the degradation of CHG at temperatures required for heat sterilizing. Heat sterilizing may also be incompatible with the applicator **24** and/or package **12** of the chlorhexidine product **10**.

In certain embodiments, depending on the chosen antibacterial agent, the method may be free of a heating step that results in the temperature of the chlorhexidine article **14** being raised above 35, 40, 50, 60, or 70, ° C. In other embodiments, the method may be free of a heating step that results in the temperature of the chlorhexidine article **14** being raised above 30° C. In still other embodiments, the method may be free of a heating step that results in the temperature of the chlorhexidine article **14** to be raised such that the chlorhexidine article **14** is considered sterile in accordance with ISO 20857, or ISO 17665. In still other embodiments, the method may be free of a heating step that results in the temperature of the chlorhexidine article **14** being raised to a temperature of from 35 to 150, of from 50 to 150, of from 50 to 130, or of from 75 to 130, ° C.

When the method comprises irradiating the chlorhexidine product **10** to form the sterilized chlorhexidine article **14**, irradiating the chlorhexidine product **10** may comprise irradiating the chlorhexidine product **10** with a radiation type selected from the group comprising gamma radiation, electron-beam radiation, x-ray radiation, or combinations thereof. In certain embodiments, the radiation type is electron-beam radiation.

The chlorhexidine product **10** may be irradiated with the radiation type by any suitable radiation unit. With reference to FIGS. **7A** and **7B**, in the illustrated embodiment, the radiation unit **30** is an irradiator **30**. The radiation unit **30** may be arranged in any suitable manner to efficiently irradiate the chlorhexidine product **10**. As an example, in the illustrated embodiments, the irradiator **30** is disposed adjacent the conveyor mechanism **28** such that either of the chlorhexidine product **10**, or the plurality of chlorhexidine products **10** disposed in the shipping container **22**, may be efficiently irradiated. With reference to FIG. **7A**, the radiation unit **30** may be disposed adjacent the conveyor mechanism **28** downstream of the cooling unit **26** for efficiently cooling the plurality of chlorhexidine products **10** disposed in the shipping container **22** and subsequently irradiating the plurality of chlorhexidine products **10** disposed in the shipping container **22**. Likewise, as shown in FIG. **7B**, the conveyor mechanism **28** may also be used for efficiently cooling and irradiating only a single chlorhexidine product **10**. It will further be appreciated that in some embodiments, the plurality of chlorhexidine products **10** may be irradiated simultaneously and not disposed in the shipping container **22**. Of course, it will be appreciated that cooling the chlorhexidine product **10** may occur separately from irradiating

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the chlorhexidine product **10**. In some embodiments, the irradiator **30** may be arranged about an irradiation platform such that chlorhexidine products can be placed on the irradiation platform and irradiated. Of course other arrangements of the irradiator **30** are contemplated.

When the radiation unit **30** is the irradiator **30**, the irradiator **30** may be, by way of non-limiting example, an x-ray generator, a gamma ray irradiator, an electron-beam accelerator, or combinations thereof. Of course, still other irradiators **30** are contemplated.

In some embodiments, when the chlorhexidine product **10** is irradiated with a radiation type, irradiating the chlorhexidine product **10** may further comprise irradiating the chlorhexidine product **10** with a radiation dose of from 5 to 25 kGy to form the sterilized chlorhexidine article **14**. In another embodiment, irradiating the chlorhexidine product **10** may further comprise irradiating the chlorhexidine product **10** with a radiation dose of from 1 to 100 kGy. In another embodiment, irradiating the chlorhexidine product **10** may further comprise irradiating the chlorhexidine product **10** with a radiation dose of from 1 to 30 kGy. In other embodiments, irradiating the chlorhexidine product **10** may further comprise irradiating the chlorhexidine product **10** with a radiation dose of from 1 to 55, of from 5 to 30, of from 10 to 25, or of from 10 to 20, of from 8 to 12, or of from 9 to 13, kGy. In still other embodiments, irradiating the chlorhexidine product **10** may further comprise irradiating the chlorhexidine product **10** with a radiation dose of at least 1, at least 5, at least 10, at least 15, at least 20, at least 25, at least 30, at least 50, or at least 100, kGy. In still other embodiments, irradiating the chlorhexidine product **10** may further comprise irradiating the chlorhexidine product **10** with a radiation dose of less than 100, less than 50, less than 30, less than 25, less than 20, less than 15, less than 10, less than 5, or less than 1, kGy. In still other embodiments, irradiating the chlorhexidine product **10** may further comprise irradiating the chlorhexidine product **10** with a radiation dose of 5, 10, 15, 20, 25, or 30, kGy. Of course, still other radiation doses are contemplated.

Irradiating the chlorhexidine product **10** may further comprise irradiating the chlorhexidine product **10** with a plurality of radiation doses. The plurality of radiation doses may be any number of radiation doses suitable to sterilize the chlorhexidine product **10**. By way of non-limiting example, the plurality of doses may be of from 2 to 5, of from 2 to 4, or of from 2 to 3, radiation doses. The chlorhexidine product **10** may be subjected to the plurality of radiation doses within 7, within 6, within 5, within 3, within 2, or within 1, days. In other embodiments, the chlorhexidine product **10** may be subjected to the plurality of radiation doses within 20, within 15, within 10, or within 5, hours. In one embodiment, the chlorhexidine product **10** may be subjected to one of the plurality of radiation doses immediately after another of the plurality of radiation doses. Each of the plurality of radiation doses may be a radiation dose of from 5 to 25 kGy, or any of the radiation dose ranges described herein.

With continued respect to irradiating the chlorhexidine product **10**, irradiating the chlorhexidine product **10** may further comprise irradiating the chlorhexidine product **10** while at least a portion of the solvent is in the solid state to form the sterilized chlorhexidine article **14**. In some embodiments, irradiating the chlorhexidine product **10** may further comprise irradiating the chlorhexidine product **10** while at least 50 wt. % of the solvent is in the solid state. In another embodiment, irradiating the chlorhexidine product **10** may further comprise irradiating the chlorhexidine product **10** while at least 75 wt. % of the solvent is in the solid state. In other embodiments, irradiating the chlorhexidine product **10** may further comprise irradiating the chlorhexidine product

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10 while at least 1, at least 5, at least 10, at least 15, at least 20, at least 30, at least 40, at least 60, at least 70, at least 80, at least 90, at least 95, or at least 99, wt. % of the solvent is in the solid state. In certain embodiments, irradiating the chlorhexidine product 10 may further comprise irradiating the chlorhexidine product 10 while all of the solvent is in the solid state. Alternatively, irradiating the chlorhexidine product 10 may further comprise irradiating the chlorhexidine product 10 while none of the solvent is in the solid state irradiating the chlorhexidine product 10 may further comprise irradiating the chlorhexidine product 10 while less than 99, less than 95, less than 90, less than 80, less than 70, less than 60, less than 50, less than 40, less than 30, less than 20, less than 10, less than 5, or less than 1, wt. % of the solvent is in the solid state.

In some embodiments, the amount of solvent in the solid state when the chlorhexidine product 10 is irradiated is the same as the amount of solvent that undergoes a phase change from the liquid state to the solid state when the chlorhexidine product 10 is cooled. For example, with reference to FIGS. 7A and 7B, when the radiation unit 30 is arranged downstream of the cooling unit 26 on the conveyor mechanism 28, the amount of solvent in the solid state when the chlorhexidine products are irradiated is the same, substantially the same, or slightly less than, the amount of solvent that undergoes a phase change from the liquid state to the solid state during cooling of the chlorhexidine products 10. Alternatively, the radiation unit may be arranged separately from the cooling unit. When the radiation unit is arranged separately from the cooling unit, the radiation unit may be arranged in a cooled environment to ensure the amount of solvent in the solid state when the chlorhexidine products 10 are irradiated is the same, substantially the same, or slightly less than, the amount of solvent that undergoes a phase change from the liquid state to the solid state during cooling of the chlorhexidine products 10. Of course, the radiation unit may be arranged in a room temperature environment.

In other embodiments, the amount of solvent in the solid state when the chlorhexidine product 10 is irradiated is different to the amount of solvent that undergoes a phase change from the liquid state to the solid state when the chlorhexidine product 10 is cooled.

In some embodiments, the sterilized antibacterial agent in the sterilized antiseptic composition has a purity of at least 90% after irradiating the chlorhexidine product 10 to form the sterilized chlorhexidine article 14. In the context of this disclosure, the purity of the sterilized antibacterial agent is the amount of sterilized antibacterial agent in the sterilized antiseptic composition after sterilizing the chlorhexidine product 10 divided by the sum of the amount of sterilized antibacterial agent and degradation impurities in the sterilized antiseptic composition after sterilizing the chlorhexidine product 10, expressed as a percentage. The purity may be expressed in the following formula:

$$\text{purity} = \frac{\text{amount of sterilized antibacterial agent in the sterilized antiseptic composition}}{(\text{amount of sterilized antibacterial agent in the sterilized antiseptic composition} + \text{amount of degradation impurities in the sterilized antiseptic composition})} \times 100.$$

For example, a purity of 98% indicates that the sterilized antiseptic composition comprises 98 parts of the sterilized antibacterial agent in the sterilized antiseptic composition

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and 2 parts of the degradation impurities in the sterilized antiseptic composition. In another embodiment, the sterilized antibacterial agent in the sterilized antiseptic composition has a purity of at least 50%. In other embodiments, the sterilized antibacterial agent in the sterilized antiseptic composition has a purity of at least 60%, of at least 70%, of at least 80%, of at least 90%, of at least 92.5%, of at least 95%, of at least 97.5%, of at least 99%, of at least 99.5%, or of at least 99.9%. In certain embodiments, the sterilized antibacterial agent in the sterilized antiseptic composition has a purity of 100%. In other words, the sterilized antiseptic composition does not comprise any degradation impurities. In still other embodiments, the sterilized antibacterial agent in the antiseptic composition has purity of from 85 to 99.5%, of from 87.5 to 99.5%, or of from 87.5 to 97.5%. Of course, still other purities of the sterilized antibacterial agent of the sterilized antiseptic composition are contemplated.

In some embodiments, the sterilized antibacterial agent in the sterilized antiseptic composition is present in an amount at least 90% of the amount of the antibacterial agent in the antiseptic composition before sterilizing the chlorhexidine product 10. In another embodiment, the sterilized antibacterial agent in the sterilized antiseptic composition is present in an amount at least 85% of the amount of the antibacterial agent in the antiseptic composition before sterilizing the chlorhexidine product 10. In still other embodiments, the sterilized antibacterial agent in the sterilized antiseptic composition is present in an amount at least 50%, at least 60%, at least 70%, at least 80%, at least 92.5%, at least 95%, at least 97.5%, at least 99%, at least 99.5%, at least 99.9%, of the amount of the antibacterial agent in the antiseptic composition before sterilizing the chlorhexidine product 10. In certain embodiments, the sterilized antibacterial agent in the sterilized antiseptic composition is present in an amount equal to the amount of the antibacterial agent in the antiseptic composition before sterilizing the chlorhexidine product 10. In still other embodiments, the sterilized antibacterial agent in the sterilized antiseptic composition is present in an amount of from 85 to 99.5%, of from 87.5 to 99.5%, or of from 87.5 to 97.5%, of the antibacterial agent in the antiseptic composition before sterilizing the chlorhexidine product 10. Of course, it is contemplated the sterilized antibacterial agent in the sterilized antiseptic composition is present in still other amounts.

In some embodiments, the antibacterial agent may be included in the antiseptic composition in an amount greater than the desired amount of the sterilized antibacterial agent in the sterilized antiseptic composition. In this manner, if the amount of antibacterial agent decreases during sterilization, there may still be a therapeutically effective amount of the sterilized antibacterial agent included in the sterilized antiseptic composition. In one embodiment, the antibacterial agent may be included in an amount less than 35% greater than the desired amount of the sterilized antibacterial agent included in the sterilized antiseptic composition. In another embodiment, the antibacterial agent may be included in the antiseptic composition an amount of from 15 to 25% greater than the desired amount of the sterilized antibacterial agent included in the sterilized antiseptic composition. In still other embodiments, the antibacterial agent may be included in the antiseptic composition an amount less than 5%, less than 10%, less than 15%, less than 20%, less than 25%, less than 30%, less than 40%, less than 50%, less than 60%, less than 70%, less than 80%, less than 90%, less than 100%, less than 200%, or less than 500%, greater than the desired amount of the sterilized antibacterial agent included in the sterilized antiseptic composition. In still other embodiments,

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the antibacterial agent may be included in the antiseptic composition an amount more than 5%, more than 10%, more than 15%, more than 20%, more than 25%, more than 30%, more than 40%, more than 50%, more than 60%, more than 70%, more than 80%, more than 90%, more than 100%, more than 200%, or more than 500%, greater than the desired amount of the sterilized antibacterial agent included in the sterilized antiseptic composition. Of course, the antibacterial agent may be included in the antiseptic composition in still other amounts greater than the desired amount of the sterilized antibacterial agent in the sterilized antiseptic composition.

When the antibacterial agent is included in the antiseptic composition amounts greater than the desired amount of the sterilized antibacterial agent in the sterilized antiseptic composition, the sterilized antibacterial agent may be included in the sterilized antiseptic composition in an amount of from 0.1 to 10 wt. % based on the total weight of the sterilized antiseptic composition. In another embodiment, the sterilized antibacterial agent may be included in an amount of from 1.5 to 5.0 wt. % based on the total weight of the sterilized antiseptic composition. In other embodiments, the sterilized antibacterial agent may be included in an amount from 0.5 to 10, of from 1.0 to 10, of from 1.5 to 10, of from 2.0, to 10, of from 2.5 to 10, of from 3.0 to 10, of from 3.5 to 10, of from 4.0 to 10, of from 4.5 to 10, of from 5.0 to 10, of from 5.5 to 10, of from 6.0 to 10, of from 6.5 to 10, of from 7.0 to 10, of from 7.5 to 10, of from 8.0 to 10, of from 8.5 to 10, of from 9.0 to 10, or of from 9.5 to 10 wt. % based on the total weight of the sterilized antiseptic composition. In still other embodiments, the sterilized antibacterial agent may be included in the sterilized antiseptic composition in an amount of from 0.1 to 9.5, of from 0.1 to 9.0, of from 0.1 to 8.5, of from 0.1 to 8.0, of from 0.1 to 7.5, of from 0.1 to 7.0, of from 0.1 to 6.5, of from 0.1 to 6.0, of from 0.1 to 5.5, of from 0.1 to 5.0, of from 0.1 to 4.5, of from 0.1 to 4.0, of from 0.1 to 3.5, of from 0.1 to 3.0, of from 0.1 to 2.5, of from 0.1 to 2.0, of from 0.1 to 1.5, of from 0.1 to 1.0, or of from 0.1 to 0.5, wt. % based on the total weight of the sterilized antiseptic composition. In still other embodiments, the sterilized antibacterial agent may be included in the sterilized antiseptic composition in an amount of from 0.5 to 8.0, of from 1.0 to 6.0, of from 1.5 to 5.0, of from 1.8 to 4.5, of from 1.8 to 3.5, or of from 1.8 to 2.5, wt. % based on the total weight of the sterilized antiseptic composition. Of course, the sterilized antibacterial agent may be included in the sterilized antiseptic composition in still other amounts.

In one embodiment, the method of sterilizing a chlorhexidine article comprises providing an applicator. The method further comprises, providing an antiseptic composition comprising water in an amount of from 50 wt. % based on the total weight of the antiseptic composition and CHG in an amount of from 1.5 to 5.0 wt. % based on the total weight of the antiseptic composition. The method further comprises, impregnating the antiseptic composition in the applicator to form the chlorhexidine article. The method further comprises sealing the chlorhexidine article inside the package to form the chlorhexidine product. The method further comprises cooling the chlorhexidine product such that at least a portion of the water of the antiseptic composition undergoes a phase change from the liquid state to the solid state. The method further comprises irradiating the chlorhexidine product while at least a portion of the water is in the solid state to form the sterilized chlorhexidine article.

In another embodiment, the method of sterilizing a chlorhexidine article comprises providing the chlorhexidine product. The method also comprises cooling the chlorhexi-

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dine product such that at a least a portion of the solvent of the antiseptic composition undergoes a phase change from a liquid state to a solid state. The method further comprises irradiating the chlorhexidine product while at least a portion of the solvent is in the solid state to form a sterilized chlorhexidine article.

One or more of the values described above may vary by  $\pm 5\%$ ,  $\pm 10\%$ ,  $\pm 15\%$ ,  $\pm 20\%$ ,  $\pm 25\%$ , etc. so long as the variance remains within the scope of the disclosure. Each member may be relied upon individually and or in combination and provides adequate support for specific embodiments within the scope of the appended claims. The subject matter of all combinations of independent and dependent claims, both singly and multiply dependent, is herein expressly contemplated. The disclosure is illustrative including words of description rather than of limitation. Many modifications and variations of the present disclosure are possible in light of the above teachings, and the disclosure may be practiced otherwise than as specifically described herein.

All combinations of the aforementioned embodiments throughout the entire disclosure are hereby expressly contemplated in one or more non-limiting embodiments even if such a disclosure is not described verbatim in a single paragraph or section above. In other words, an expressly contemplated embodiment may include any one or more elements described above selected and combined from any portion of the disclosure

It is also to be understood that any ranges and subranges relied upon in describing various embodiments of the present disclosure independently and collectively fall within the scope of the appended claims, and are understood to describe and contemplate all ranges including whole and/or fractional values therein, even if such values are not expressly written herein. One of skill in the art readily recognizes that the enumerated ranges and subranges sufficiently describe and enable various embodiments of the present disclosure, and such ranges and subranges may be further delineated into relevant halves, thirds, quarters, fifths, and so on. As just one example, a range "of from 0.1 to 0.9" may be further delineated into a lower third, i.e. from 0.1 to 0.3, a middle third, i.e. from 0.4 to 0.6, and an upper third, i.e. from 0.7 to 0.9, which individually and collectively are within the scope of the appended claims, and may be relied upon individually and/or collectively and provide adequate support for specific embodiments within the scope of the appended claims. In addition, with respect to the language which defines or modifies a range, such as "at least," "greater than," "less than," "no more than," and the like, it is to be understood that such language includes subranges and/or an upper or lower limit. As another example, a range of "at least 10" inherently includes a subrange of from at least 10 to 35, a subrange of from at least 10 to 25, a subrange of from 25 to 35, and so on, and each subrange may be relied upon individually and/or collectively and provides adequate support for specific embodiments within the scope of the appended claims. Finally, an individual number within a disclosed range may be relied upon and provides adequate support for specific embodiments within the scope of the appended claims. For example, a range "of from 1 to 9" includes various individual integers, such as 3, as well as individual numbers including a decimal point (or fraction), such as 4.1, which may be relied upon and provide adequate support for specific embodiments within the scope of the appended claims.

Several embodiments have been discussed in the foregoing description. However, the embodiments discussed herein

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are not intended to be exhaustive or limit the invention to any particular form. The terminology which has been used is intended to be in the nature of words of description rather than of limitation. Many modifications and variations are possible in light of the above teachings and the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A sterilized chlorhexidine product for topical disinfection, said sterilized chlorhexidine product comprising:  
a sterilized chlorhexidine gluconate composition;  
an applicator for facilitating application of the sterilized chlorhexidine composition; and  
a barrier configured to be compromised to impregnate the applicator with the sterilized chlorhexidine gluconate composition;  
wherein the sterilized chlorhexidine gluconate composition comprises chlorhexidine gluconate and alcohol.

2. The sterilized chlorhexidine product of claim 1, comprising the sterilized chlorhexidine gluconate composition in an amount between 0.1 and 100 mL.

3. The sterilized chlorhexidine product of claim 1, wherein the sterilized chlorhexidine gluconate composition comprises chlorhexidine gluconate in an amount of from 1.5 to 5.0 wt. % based on the total weight of said sterilized antiseptic composition and the alcohol in an amount of at least 50 wt. % based on a total weight of said sterilized antiseptic composition.

4. The sterilized chlorhexidine product of claim 3, wherein the sterilized chlorhexidine gluconate composition comprises chlorhexidine gluconate in an amount of 2.0 wt. % based on the total weight of said sterilized antiseptic composition and the alcohol in an amount of 70 wt. % based on a total weight of said sterilized antiseptic composition.

5. The sterilized chlorhexidine product of claim 1, wherein the alcohol is isopropyl alcohol.

6. The sterilized chlorhexidine product of claim 1, wherein the sterilized chlorhexidine gluconate composition further comprises water.

7. The sterilized chlorhexidine product of claim 1, wherein the sterilized chlorhexidine gluconate composition further comprises one or more additives selected from the group consisting of a sterilized surfactant, a sterilized pH adjuster, a sterilized odorant, a sterilized colorant, a sterilized stabilizer, a sterilized skin protectant, a sterilized preservative, or combinations thereof.

8. The sterilized chlorhexidine product of claim 7, wherein the additive is a colorant.

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9. The sterilized chlorhexidine product of claim 7, wherein the additive is a skin protectant.

10. The sterilized chlorhexidine product of claim 1, wherein said sterilized chlorhexidine article has a sterility assurance level of from  $10^{-3}$  to  $10^{-9}$ .

11. The sterilized chlorhexidine product of claim 1, wherein the applicator comprises a foam.

12. A method of using a sterilized chlorhexidine article, said method comprising:

providing a sterilized chlorhexidine article, the sterilized chlorhexidine article comprising:

a sterilized chlorhexidine gluconate composition comprising chlorhexidine gluconate and alcohol;

an applicator for facilitating application of the sterilized chlorhexidine; and

a barrier between the sterilized chlorhexidine gluconate composition and the applicator;

compromising the barrier to impregnate the applicator with the sterilized chlorhexidine gluconate composition; and

applying the sterilized chlorhexidine gluconate composition to a patient's skin using the applicator.

13. The method of claim 12, wherein the applicator is impregnated with 0.1 to 100 mL of the sterilized chlorhexidine gluconate composition.

14. The method of claim 12, wherein the sterilized chlorhexidine gluconate composition comprises chlorhexidine gluconate in an amount of from 1.5 to 5.0 wt. % based on the total weight of said sterilized antiseptic composition and the alcohol in an amount of at least 50 wt. % based on a total weight of said sterilized antiseptic composition.

15. The method of claim 12, wherein the alcohol is isopropyl alcohol.

16. The method of claim 12, wherein the sterilized chlorhexidine gluconate composition further comprises water.

17. The method of claim 12, wherein the sterilized chlorhexidine gluconate composition further comprises one or more additives selected from the group consisting of a sterilized surfactant, a sterilized pH adjuster, a sterilized odorant, a sterilized colorant, a sterilized stabilizer, a sterilized skin protectant, a sterilized preservative, or combinations thereof.

18. The method of claim 17, wherein the additive is a colorant or a skin protectant.

19. The method of claim 12, wherein said sterilized chlorhexidine article has a sterility assurance level of from  $10^{-3}$  to  $10^{-9}$ .

\* \* \* \* \*



FORM 30. Certificate of Service

Form 30  
July 2020

# UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

## CERTIFICATE OF SERVICE

**Case Number** 2023-1603, 2023-1604

**Short Case Caption** Sage Products, LLC v. Becton, Dickinson and Company

**NOTE:** Proof of service is only required when the rules specify that service must be accomplished outside the court's electronic filing system. See Fed. R. App. P. 25(d); Fed. Cir. R. 25(e). Attach additional pages as needed.

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☐ Other: \_\_\_\_\_

on the below individuals at the following locations.

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☐ Additional pages attached.

Date: 08/22/2023

Signature: /s/ Annette Vonder Mehden

Name: Annette Vonder Mehden

FORM 19. Certificate of Compliance with Type-Volume Limitations

Form 19  
July 2020

**UNITED STATES COURT OF APPEALS  
FOR THE FEDERAL CIRCUIT**

**CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME LIMITATIONS**

**Case Number:** 2023-1603, 2023-1604

**Short Case Caption:** Sage Products, LLC v. Becton, Dickinson and Company

**Instructions:** When computing a word, line, or page count, you may exclude any items listed as exempted under Fed. R. App. P. 5(c), Fed. R. App. P. 21(d), Fed. R. App. P. 27(d)(2), Fed. R. App. P. 32(f), or Fed. Cir. R. 32(b)(2).

The foregoing filing complies with the relevant type-volume limitation of the Federal Rules of Appellate Procedure and Federal Circuit Rules because it meets one of the following:

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Date: 08/22/2023

Signature: /s/ Sandra A. Frantzen

Name: Sandra A. Frantzen